THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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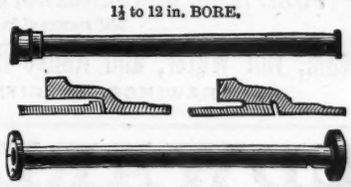

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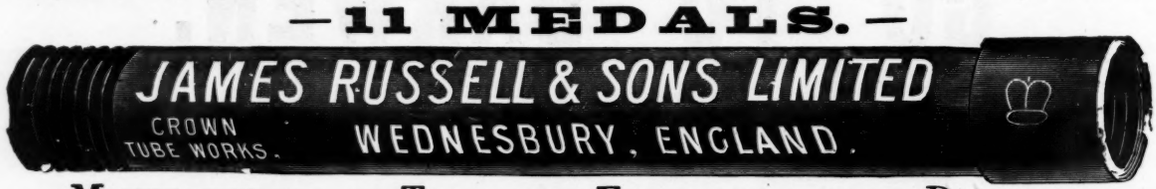

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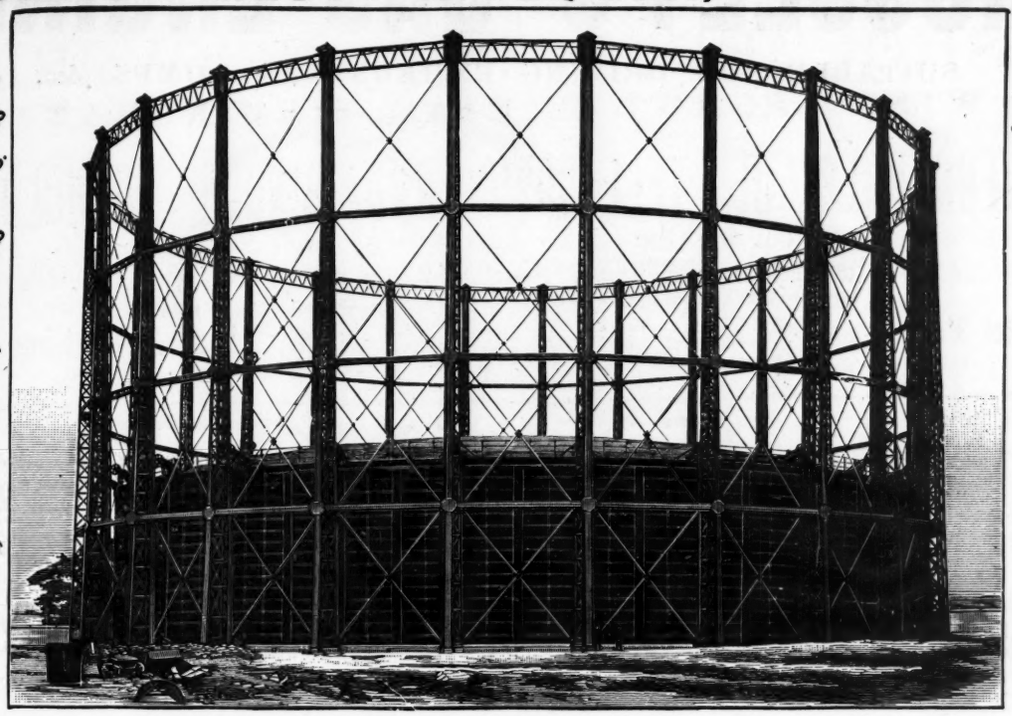

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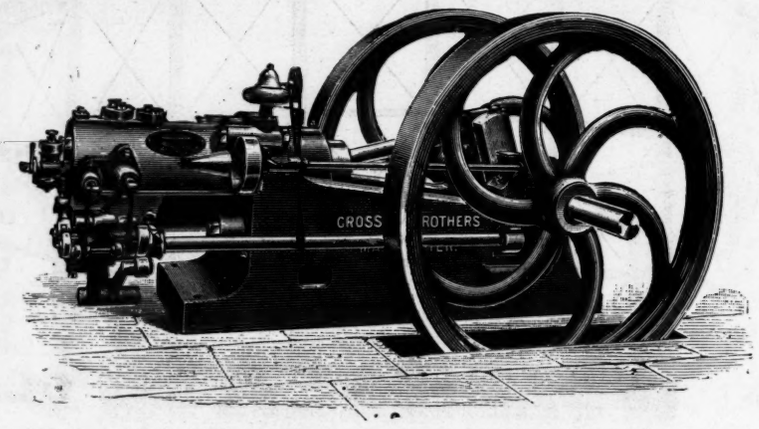

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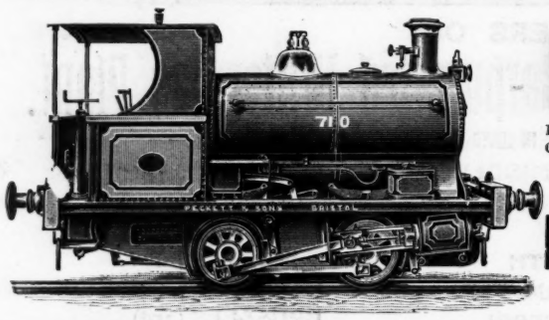

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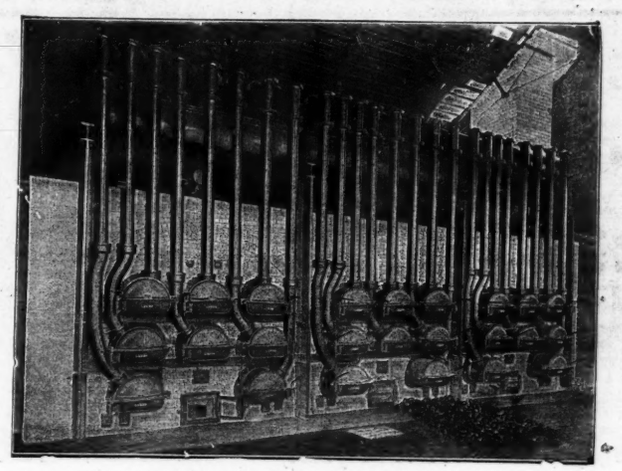

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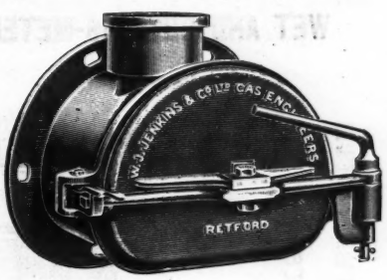

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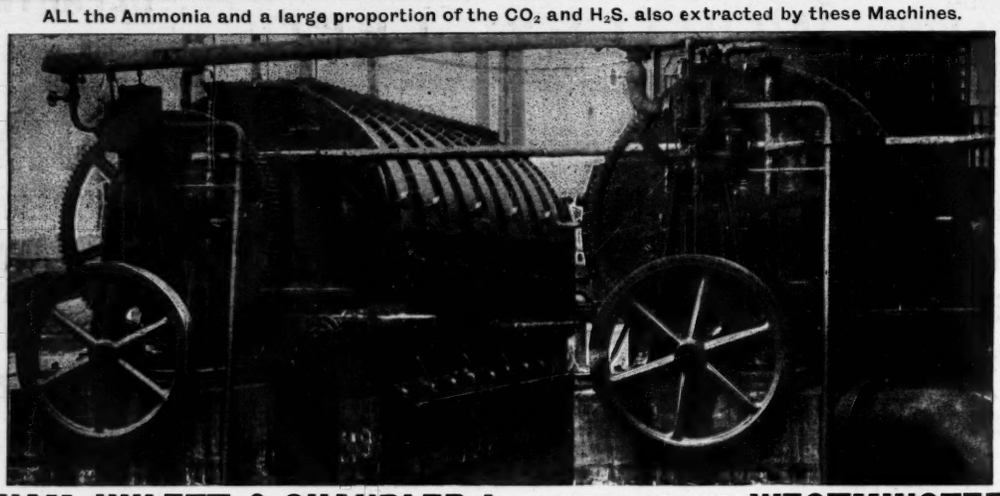

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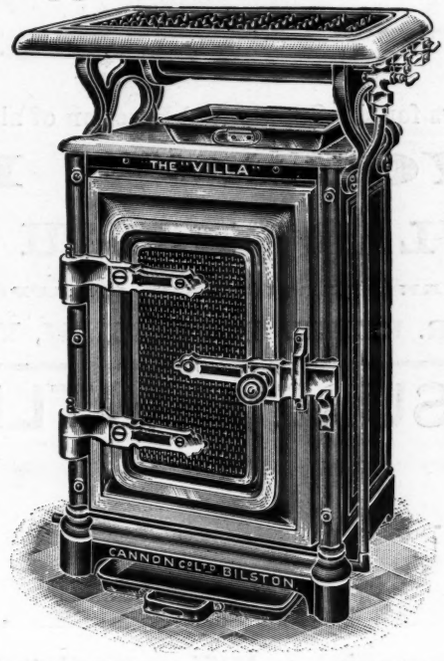

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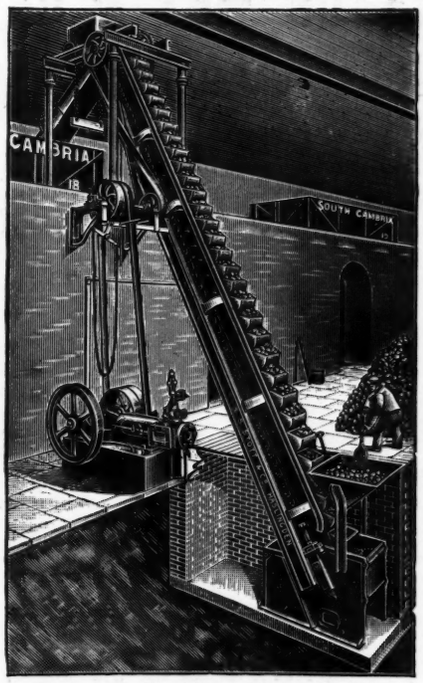

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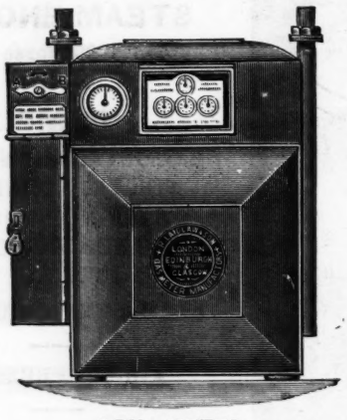

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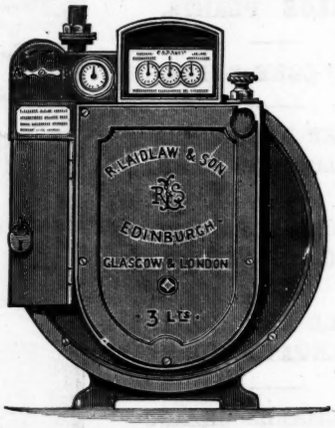

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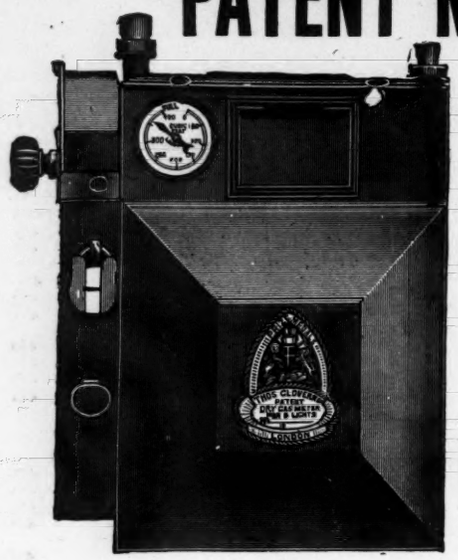

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

VOL. LXXVIII., No. 1997.——TUESDAY, AUGUST 20, 1901.

EDITORIAL NOTES.

The Value of an Audit.

In another part of to-day's issue will be found a reproduction from the "Accountants' Magazine" of a portion of an article on "Auditing of Gas Companies' Accounts." The general principles enunciated by the writer as being those that ought to be—as distinguished from those that usually are—followed by auditors in the prosecution of their duties, are those that have been on more than one former occasion laid down in the columns of the "Journal." In the article now under notice, the writer proceeds from the general to the particular, and applies the policy of "auditing by samples" to each of the various divisions of a company's balance-sheet, drawn up on the lines of the schedule to the Gas-Works Clauses Act, 1871. If the auditors of the various gas undertakings would but adopt this common-sense method of examining the accounts they certify, instead of continuing content with the method generally in vogue (which may be briefly described as farcical), their certificates would acquire the value which they ought to possess, but which at present no one having more knowledge of the affairs of a gas undertaking than the shareholders (and who could possess a smaller quantity of that knowledge?) would ever dream of ascribing to them.

The Editor of the "Accountants' Magazine" expresses the opinion that the article should excite "general interest, "from the extremely wide view which the writer takes of the "scope of an audit." We trust it will. But it is the attention and interest of shareholders, as well as that of auditors, which needs exciting; for unless shareholders realize the uselessness of the perfunctory audits often conducted, and not only create a demand for something more valuable, but show willingness to pay adequately for it, we are afraid that auditors will shrug their shoulders and pin their faith to the easy policy of *laissez faire*. The editorial comments proceed—

> We fully approve of an auditor gaining all the knowledge he can of the practical details of the concern he is examining; and it is a good thing for him occasionally to visit the place, and to keep his eyes open. At the same time, it must not be forgotten that an accountant's business is with accounts; and when it is suggested that he should personally verify the existence of a stock of coal, or satisfy himself by examination of the subjects of alleged capital expenditure, we think that, in undertaking to do so, he would be extremely liable to be deceived, and would be assuming a heavy responsibility which he would be ill fitted to sustain. No auditor is omniscient.

The suggestion that he is, or could be expected to be, has surely never been made or implied. But it is suggested, and we agree, that he should take pains to know as much as possible, and not to believe that everything is all right because somebody else—whose accuracy is really the question—says so. An auditor's business is, as we conceive it, not only with accounts, but with facts; and because the entries in one book agree with those in another, it by no means follows that the figures in either tally with the facts. An auditor finds in a balance-sheet an item: "Stores in "hand—coals, £5000." For his satisfaction that the item is correct, he is shown a certificate from the engineer of the works, stating that, on the account day, there were (say) 10,000 tons of coal in his stores. Is that to be deemed to be as complete a proof of the existence of that asset as the auditor need require? If the asset were "Consols, £5000," would he be satisfied with the secretary's certificate to the effect that the company, on the account day, held scrip to that value? We think not. And if an auditor would deem it his duty to inspect stock certificates, mortgage deeds, and such like—which are not "accounts," but proofs of facts—before certifying a balance-sheet containing assets represented by the certificates, deeds, &c., why should he excuse himself from inspecting the stock of coal?

Where the average professional auditor feels himself unqualified to certify as to the value of property included among the assets of the concern whose balance-sheet it is his duty to examine, he does not say: "I am not omniscient, "therefore I will certify that for which I cannot vouch;" he calls in a duly qualified valuer, and obtains his verification of the asset before signing the account. If an auditor does not feel himself competent to measure the stock of coal on a gas-works, there are plenty of independent people who would be ready and able to do it efficiently for him; and, as we are reminded, it is provided, by section 108 of the Companies Clauses Consolidation Act, 1845, that "it shall be "lawful for the auditors to employ such accountants *and* "*other persons* as they may think proper, at the expense of "the company." There is, therefore, no occasion for an auditor to enter "a sphere where he would be extremely "liable to be deceived." But, if he does not, he must see that some other qualified and independent person does; and it seems to us that he "assumes a heavy responsibility" if he neglects such means of assuring himself as to the accuracy of items he cannot personally test.

We have always contended, and we are just as firmly as ever convinced, that unless auditors are prepared to make their investigations searching, take-nothing-for-granted, and laborious, they are acting dishonestly in accepting the fees attached to their office. Those fees, it is true, are often inadequate to remunerate the auditors for an efficient performance of their duties, and should be increased. But this does not excuse the auditors for inadequately performing the duties they have undertaken; and the insufficient fees were far better saved than paid away for the enactment of a farce that some people may be deceived into imagining a serious business. An audit is either valuable or else worse than worthless. Very frequently, we fear, it is the latter.

The South Metropolitan Meetings.

As usual, the half-yearly ordinary general meeting of the South Metropolitan Gas Company last Wednesday was replete with interest, in several kinds; while the speech of the Chairman, Mr. George Livesey, contained all the matter of a liberal education in the higher levels of gas administration. The address dealt luminously with the chief points of policy for all gas undertakings—capital expenditure, maintenance of works, rating, coal and coke prices, the charge for gas and its connection with consumption, the parliamentary regulation of gas companies—a pretty full list of topics of the first importance—to which were added some minor considerations. As regards the capital expended by the Company, the Chairman was able to convey to the proprietors the gratifying assurance that the undertaking is worth more than it stands at in the books. This is not merely because of the growth of the business, but in a higher degree by reason of the thoroughness with which the plant has been renewed out of revenue. In respect of the rating, the Chairman is to be congratulated upon the successful issue of his long struggle with the assessment authorities. A careful perusal of Mr. Livesey's few remarks upon this head will enlighten those who only know the speaker by repute as to the basis of his remarkable success as a gas administrator. His secret is an open one. It lies, in the first place, in competent knowledge; and, secondly, in dogged perseverance in pursuing a reasonable aim after a fixed system. Mr. Livesey does not do things by fits and starts. In this business of rating, he has not had a big fight over figures on one occasion, and let things take their own course before and after. For twenty years he has striven systematically for that uniformity of gas-works rating which he has regarded as more to be desired than a chance bargain; and at length he is able to say that his object has been attained. There was not very much to be added to the words of the Directors' report on the prices of coal and coke, and the influence of gas prices on consumption; but the Chairman said enough to indicate that he at least does not regard the demand for gas as being automatic and unaffected by its cost.

Passing over Mr. Livesey's remarks concerning electrolysis with the comment that, as usual, he is determined to fight this point through until he gets reasonable satisfaction, the most generally interesting portion of his speech will be found to be that relating to the treatment by Parliament of the question of the illuminating power of gas. He roundly declares that the action of local authorities in moving Parliament to lay gas companies under the obligation to supply gas of a high illuminating power has been all wrong. It has never done the public a particle of good; but, on the

other hand, it has had the effect of taxing the consumers heavily for no corresponding advantage. At first the cannel coal owners reaped the benefit; now the oil masters get it. The Chairman heaped ridicule upon penalty gas testing and its results, and hinted that the Company are not likely to stop at 14-candle gas any longer than is expedient for making out a good case for further liberty. It is no wonder that the professors of statutory photometry hold Mr. Livesey in high despite. Parliamentary arrangements which are mainly good for providing small but snug official positions for a number of respectable gentlemen with unexceptionable credentials and useful family connections, are not venerated by him.

The short special general meeting which followed the ordinary general meeting satisfactorily set the seal of permanence upon a valuable experiment. It is unnecessary to go over all the ground that was opened up by the appointment of Workmen Directors on the South Metropolitan Board. Suffice it to say that the innovation was looked upon with much reasonable misgiving by many men of ordinary commercial and financial experience; and it was only the temporary nature of the original scheme that permitted of its passing. Once more, hypothetical objections have been swept away by results. If there have been any hitches in the working of the first arrangement made under the Company's Act of 1896, they have not been noticed in the triumphant development of the undertaking; and certainly nothing could have been handsomer than the full and frank explanation offered by Mr. Ewart of his change of views in respect to the actual outcome of the experiment. The Chairman's testimony, also, to the successful operation of the scheme leaves nothing to be desired, and constitutes a sociological record of immense value.

The Irish Association Meeting.

In its reconstructed form, the Irish Association of Gas Managers may be emblematized, not by the Phœnix—for the North of Ireland Gas Association were not in ashes when they resolved to extend the benefits of community to their brethren of the South—but by the Eagle renewing its youth. It was matter of gratification to all that, at the meeting in Dublin last Tuesday, there should have been so excellent a muster—bearing testimony, as it did, to the appreciation of southern managers of their admission to the Association, and the pleasure the northern members had in extending the hand of friendship to them. With such a United Ireland looking after the interests of the gas profession—as the Lord Mayor of Dublin tersely put it—there are possibilities for development which have not hitherto existed. The welcome of the Lord Mayor was happily couched and lofty in tone, calculated to encourage, if that were necessary, the spirits of those who are labouring to keep the profession upon a forward course. That such men exist in no small numbers, the proceedings at the meeting show.

The President (Mr. W. A. Reid), in his address, put forward some wise reflections as to the management of gas-works—reflections which must give rise to a feeling of keen regret that they will practically remain a sealed book to the Directors and Committees who are in charge of these establishments. To instruct them in gas matters, nothing better could be employed than the circulation among the class of such literature as the Presidential Address by Mr. Reid, and the papers and discussions at meetings of gas managers. Boards and Committees, as a rule, understand the financial side of the businesses they control, although there are, it is true, some sad *laches* in this connection. But the technical side is beyond their reach. To place intelligently before them the actual state of the industry would mostly lead to their falling in with the ideas of the manager, and would thereby conduce to his greater comfort and the advance of the industry. No manager who is conscientiously doing his duty need fear the fullest knowledge on the part of his employers. Even the annoyance which is felt at present by the existence of a "policy" man or two upon a board, would soon be removed by a general levelling-up in technical knowledge. The paper by Mr. Tooms on the troubles he had with a gasholder at Waterford may be taken as a case in support of this view. An instructed directorate would scarcely have sanctioned the addition of the weight of two lifts to a gasholder which, as a single-lift one, had shown that it was too heavy for the foundations upon which the tank rested. There is little doubt that, whoever was responsible for an engineering scheme so open to question, it was adopted on the ground of economy—a ground which was certainly not justified in the result. This was the initial mistake; the leaving of the wood inside the holder, shocking though it was, being only the mechanism which pulled the trigger, and called attention to the defects of the holder.

With regard to the other technical matters, Mr. C. B. Tully is a man of indomitable ingenuity. He again came forward to champion the cause of enrichment, upon which subject he entertained his hearers last year at Sligo, when he occupied the presidential chair. This scheme may be confidently recommended for consideration, and all the more so because, in working it out, he has taken along with him the master-minds in the chemical field of the world of gas production. Mr. S. B. Langlands opened up a subject which is interminable in his paper on "The Relation of Consumers to "the Gas Manager." It is a subject on which there never will be finality. The members found this out when it was borne in upon them that they had discussed matters relevant and irrelevant—it is so easy to get off the rails when so wide a subject is under consideration—that there was not sufficient time left for Professor Ivison Macadam's lecture. But "all's well that ends well;" and that is only what can be said of this, the first meeting of the Irish Association of Gas Managers.

The Coal and Coke Markets.

The spurt in the northern coal trade continues, and it incidentally affords an interesting example of the fatuity of attempts made to control the course of economic laws. The coal trade generally is, and has for some months past been, on the ebb; and the miners in South Wales are striving hard to avert the inevitable result—a fall in prices and wages. Accordingly, they are doing all they can to keep down the output by taking liberal holidays, in pursuit of which policy they gave up so much time to their National Eisteddfod that the output for a week was only equal to one normal day's production. What has been the result? That prices have been enhanced for Cardiff coal? No; that Northumberland steam-coal owners are scarcely able to supply the demand (swollen by the diversion of orders from Wales), and that prices have risen in the North! Did we not know the firmness with which the idea is imbedded in the minds of the Welshmen, that the policy of restricting output—and at the same time restricting earnings—is a 'cute one, we should be inclined to think the present state of affairs would be educative.

However this may be, the northern market is fairly well satisfied with the state of affairs; but the far-sighted among the colliery folk there as elsewhere are doubtless very ill satisfied with prospects beyond the immediate future. The improvement in the iron trade they know to be quite too small a matter to restore lasting firmness to the coal trade, even if the American labour troubles prove a long while in the settling. At the end of July there were in blast only 309 furnaces, compared with 376 a year previously; being an increase for the month of only two furnaces. This does not look as though ironmakers are excited about the future. Certain it is they have no reason to be; for, whatever may happen in the home market—and nothing beyond an average normal business is to be expected—the outlook as to foreign trade is extremely dismal. The position of affairs in Germany is so serious as to merit almost the description of critical—over-production, over-speculation, and dishonest finance, coupled with the fact that this industrially youthful, if very energetic, nation has no vast accumulation of capital at its back, having brought about a state of things which (complicated as it is by the growing struggle between the agricultural and industrial interests) is causing grave anxiety to those in authority, but from which we hope and believe that Germany will eventually emerge—sadder, perhaps, but wiser and stronger. The prosperity of other nations makes for our own; so that, on the lowest ground, we have cause to wish Germany well. But no one who has observed the energy, devotion, and ability now displayed by our German competitors in their struggle for a place of honour in the world of commerce will wish them anything but a speedy recovery from the depression that is now their portion.

In Belgium and in France, marked slackness also prevails; so that our export trade in iron is bound to be on a very moderate scale for a considerable time to come. So also, we may remark, must be our exports of coke. The latest reports speak of large stocks of coking coal being accumulated—a fact which some producers of coke in this country should be careful to note. At present, the coke trade is looking up somewhat, in sympathy with iron; so that there is reason to hope that such of the contracts for

London-made gas coke as have not been concluded for the ensuing year (we understand that the market is recovering by degrees from the disorganization that followed the abortive attempt to sell Beckton coke at 14s. a ton, and that 12s. 6d. is proving a figure at which good business can be done) should not prove unusually difficult of negotiation. But for the initial miscalculation, and the distrust induced by the tendering system, we believe the whole business would have been settled on a 12s. 6d. basis before now.

The future of the coal market is rendered very uncertain by the possibilities involved in the wages question, which at present threatens to become immediately acute in Scotland. The Scotch Coal Trade Conciliation Board met on the 8th inst., and the employers put forward a claim to a further reduction of miners' wages to the extent of 12½ per cent. on the standard rates of 1888, such reduced rates to continue until the end of October. Wages in the Scotch coalfields last year were increased to 100 per cent. above the basis—making a rate of 8s. per day. Subsequent reductions of first 25 and then 12½ per cent. (equal to 1s. 6d. per day) have been made, and the masters are therefore now asking for wages to be fixed at 50 per cent. above the standard, which was the rate in vogue in West Scotland at the end of 1898. The representatives of the men declined to agree to any reduction, but undertook to lay the matter before their constituents, and announce their decision on the 21st inst. It is a virtual certainty that this decision will be a practically unanimous refusal on the part of the men to agree to a reduction. There is talk of a conference over the question with the Miners' Federation of Great Britain; it being suggested that the export tax is at the bottom of the proposed reduction. Developments will be awaited with interest.

These wages questions will undoubtedly disturb the progress of events for some time to come; but we believe that so soon as they are adjusted, and the men settle down to try and make up in quantity what they have lost in price, the slump in the coal trade will become more acute than it has yet been since the rise began in 1899. Current contracts are by no means at bottom prices.

Report of the Commission on Arsenical Poisoning.

THE First Report of the Royal Commission appointed to inquire into Arsenical Poisoning from the consumption of beer and other articles of food or drink has been issued, and forms a Blue-book which is now on sale at the low price of twopence. From this statement it may be gathered, and rightly, that it is not a very voluminous compilation. The minutes of evidence taken by the Commission will be of a different character. Although brief, the report is full of weighty matter. It admits that towards the end of 1900 there was exceptional sickness and death attributable to arsenical poisoning, chiefly affecting districts in Lancashire and Staffordshire. Manchester suffered most; the number of cases in the county boroughs of Manchester and Salford alone being put at 3000. It was not until November, 1900, that arsenic was indicated by Dr. E. S. Reynolds, of Manchester, as the cause of the epidemic sickness in the city. The beer then in consumption was tested, with the result that arsenic was found in dangerous proportions in a large number of samples. When the beer was withdrawn from sale, the epidemic came speedily to an end. So far, the tale is highly creditable to the perspicacity and public spirit of the chief parties to the discovery and suppression of the trouble. What follows, however, is not quite such pleasant reading. The well-known story of the arsenious brewing sugar is narrated; but, having regard to the fact that the business transactions between the firms implicated are about to come before a Court of Law, the Commissioners did not go into the question of responsibility. We mentioned at the time the remarkable difference between the scrupulosity of many public analysts in the matter of a little sulphur in gas, and their innocence as regards the character of the beer that was poisoning half Lancashire; but it is admitted by the Commission that the analysis of beer for arsenic is a doubtful process. They propose to inquire further into this matter, with the purpose of presenting a standard test.

On the point of the possibility of arsenic getting into beer by way of the malt, and originating in the fuel used in malting, the report remarks that more knowledge is desirable. Further evidence is to be received, and the Commissioners say that they have reason to believe that this subject is being studied by maltsters, with a view to the adoption of the most suitable precautions to avoid risk of the access of arsenic to their malt. If malt is dried by hot air alone, the products of combustion do not reach it, and therefore it does not matter what fuel is burnt; but most maltsters declare for actual firing of the malt. The Commissioners are of opinion that the use in the malting-kiln of fuel selected on account of its freedom from arsenic, supplemented by a careful process of screening, brushing, and cleansing the malt, will ensure the protection of the public from danger due to the presence of arsenic in malt. Dr. Whitelegge, in a separate note to the report, lays stress upon the importance of carefully selecting an arsenic-free malting fuel. One of the main points of the report is that the Commissioners do not feel justified in passing any article of food or drink as fit for consumption which shows even the smallest arsenic contamination which the most delicate analysis might detect. Let us hope that the growing market for gas coke provided by the increasing use of steam motor vans will compensate producers for the loss of the malting trade.

Length of the Working Day in America.

A VERY interesting discussion on the perennial topic of the proper hours of the adult mechanic's day was given in the July number of the "Engineering Magazine." The question arose out of the strike of the Trade Union mechanics—or "machinists," to give them their proper classification—for a nine-hour day without reduction of wages. The associated employers were willing at first to grant a 54-hour week; but matters grew complicated, and a strike of Union men all over the country was precipitated. This was a keen disappointment to those who had trusted in association and conference to avert labour troubles. The employers and the men's representatives were actually in treaty, when the outbreak came at the command of the Union. It is interesting to note here that the reason assigned for the strike is a luminous commentary upon the state of American industrial opinion. Over and over again, British workmen have been taunted with the longer hours contentedly accepted by their rivals the Continental and American mechanics; and now it appears that the American wants to get rid of this difference, and work the same time as his British brother. It was the masters who put the day at 10 hours, not the men. One American employer after another declares that if his men will work for only nine hours a day, his foreign trade will be gone. Not much faith in superior American shop methods here! Mr. Walter Wood, of Philadelphia, puts the matter upon its natural basis when he remarks that the question is really how many hours men can comfortably work. Whatever this period may be, there will always be in the world earnest and active men who will want to work that number of hours; and it is they who will get the best of the trade in the long run. Coming down to particulars, Mr. Wood said he should feel it a mistake if the hearty well-fed men of the United States could not do their ten-hour day and put in their pockets the money coming from it. Englishmen only work nine hours. If Americans go on working ten hours a day, they must maintain a pull on the Englishman. Think what an enormous difference the extra hour's output must make for the whole of the strenuous population of the United States!

It is very remarkable how the eight-hour day agitation, which two or three years ago was so lively in England that one could scarcely pick up a newspaper or magazine without seeing some mention of it, has died out. Many shops where it was tried have given it up and returned to the old working hours. Mr. Walter Wood's rule really governs the industrial world; and nowadays, with so much work done by machines, it is absurd to pretend that it hurts any man to stand and watch a tool for 9½ hours. Nobody can truthfully say that the British workman works a slavish number of hours. Indeed, he is a man to be greatly envied in this regard. Few of the working people who rank as his social superiors, the professional men and others, have such short hours. Many of this order of the community never know when their work is done, and are thankful if it allows them to sleep a reasonable number of hours at night. The great question of the future for the industrial world is not the nominal length of the machinist's and mechanic's day, but the spirit and the rate at which he works in it. Competent and impartial foreigners aver that the British workman is much slacker than the American. He does not produce so much while he works, and he plays more. A good deal of this laziness is obviously a fruit of Trade Unionism, with its levelling down of the performance of all the men in a shop or on a building to the ability of the worst, and its teaching that the more work one man does the less remains for others. It

is also encouraged by Trade Union aversion to machines. The strike of moulders at Hull is a good example of how men are ruined and made worthless in this way. The moulders first struck against the introduction of certain moulding machines; and when they found themselves beaten at this, they made the usual claim that only full-wage mechanics should work the machines. Where this was conceded, it was found that the machines did not turn out anything like their normal production, and had a tendency to break down. Consequently, the machines are now entrusted to handy labourers, and the moulders are out of it.

Another cause of the deterioration of the British workman is the increase of municipal trading. Evidence as to this came out the other day in a curious fashion. The growing use of English roads for motoring and cycling has revealed the fact that they are not everywhere maintained in such good order as they exhibited in the bygone turnpike days. The subject was discussed at a conference of interested persons; and one District Surveyor after another testified to the scarcity of really good road menders, paviors, and indeed workmen of any kind required in municipal service. They think that any sort of work is good enough for the public, and there is an incessant plying of the Surveyor to put in this or that worthless nominee of an alderman or a councillor. It is obvious that this kind of thing is very bad for all concerned. To return to the general subject, it is only too certain that there is a great deal of truth in the foreign criticism of the British workman; and the worst of it is that no remedy suggests itself. The rising generation are spoilt from their school days; and most of the influences under which they come afterwards are inimical to their prospects of developing into the smartest workers in the world, which they must become if this country is to keep her place in the procession of the nations. What the average workman does not see is that he ought to be in peace what the British soldier is in war. The duty to be done, and the object to be reached, are the same in both cases; but whereas he would be a daring man who should tell a British workman that his fighting brother is not the finest fellow that walks the earth, he himself will hear unmoved that he is not doing the work he should. The British industrial world, in short, is out of harmony with the national working in other regards.

Smokeless Fires.

At the recent congress of the Royal Institute of Public Health, held at Eastbourne, Sir C. A. Cookson read a paper describing "A Smokeless London," adjusted to the ideals of Sir W. B. Richmond's Society. The author wielded some terrific statistics. He stated that there are 18 million tons of coal burnt annually in London, of which the largest portion is consumed in trade furnaces. If these were all smokeless, there would be a diminution of not less than 50 per cent. in the blackness of a London fog. This is a funny statement to make, seeing that the Governor of the Gaslight and Coke Company actually complains of the degeneration of the "London particular" as one cause of the falling off in gas consumption! Take away half of such fogginess as remains, and where will the Company be then? We cannot, however, bring ourselves to rely either on these statistics or on the use that is here made of them. There cannot possibly be 10 million tons of coal annually burnt in London factory furnaces. With regard to the greater offender in the way of smoke production, the domestic hearth, Sir C. A. Cookson had to fall back upon the old suggestions that all householders should burn anthracite or coke. Unhappily, ample experience proves that they will burn neither, if they can help it. In order to grapple with the problem of how to make enough coke to warm all London, the author could only talk of the possibility of making more than the gas-works can supply, by the erection of coke-ovens. He has personally satisfied himself that coke fires can be lighted by means of gas-torches at a cost of 2d. each per week, whereas kindling wood costs 5d. per week per fire.

Unfortunately, this cause of smoke prevention is invariably handicapped by the amateurishness of its advocates. As partisans, moreover, they always fail to make allowance for the factor of taste in these matters. What is the use of belauding gas, coke, or anthracite fires to a householder who tells you that all these things are abominations in his sight, and that he would not for a moment live in a room with one? Those who know most about the subject have usually given up the attempt to persuade average people not to burn coal. It has always been our own view that the problem can be most hopefully attacked indirectly and in detail. Instead of asking people not to burn coal, which is to waste one's breath, let the inducements to do so be reduced as much as possible by dwelling on the unquestioned convenience of the gas cooking-stove, the gas-fire (where it is likely to be appreciated), and by encouraging builders of town houses to make more use of hot-water heating. The last is usually done by the agency of coke-stoves; and if the chilly and damp feeling of halls and corridors in the autumn and spring time were corrected by this means—a 2-inch pipe would generally be ample for the purpose—not half the smouldering, dirty little fires would be required.

Why Do Not Workmen Wash?

A good deal of discussion has gone on of late years concerning the question of cleanliness as affecting men employed in the mechanic crafts. The dirty clothing and person of the workman have undoubtedly a great deal to do with the low place he holds in the social system, compared (say) with the clerk or office hand who is far less independent, and worse off. A great improvement has been made in this matter of late years; so that nowadays many mechanics are personally quite as smart, even in their working garb, as is good for them. But unquestionably the conditions in many factories and workshops are not conducive to the preservation of a reasonable standard of self-respect on the part of the workmen. Public opinion changes very slowly in matters of this kind; but those who know the British workman as he is have reason for doubting whether he has changed much for many years in point of personal cleanliness. We hear of German workshops fitted with spray-baths, and similar luxuries, including wardrobes where the hands can keep their working clothes; and we wonder how long it will be before the average British workman would rest content to stay on the premises long enough after the bell rings to take a bath, and have a thorough change, before going home. This remark does not apply to gas stokers, who work at intervals, and have ample time for washing before leaving off, but to mechanics who are supposed to go on at a steady gait until the bell rings.

The question has an important sanitary, as well as a social, bearing. Workers in metals get the mineral matter into their systems to an extent that outsiders would scarcely credit. The fact is made prominent in the report on the Birmingham trades, prepared by a Factory Inspector; it being stated that the cleanest workpeople in the city are the jewellers, for the reason that, from motives of economy, the employers insist upon ample washing before leaving the shop for everybody who handles gold or silver. The sediment of the washing water is worth collecting. In the case of plumbers and gas-fitters, the case is otherwise; but no cleanly person who has seen the men of a brass or lead factory turn out for dinner without any attempt at washing their hands, can resist the impression that between such people and the office workers the difference is more than the colour of the coat. So long as the denomination of the "Great Unwashed" continues to apply in a special degree to mechanics, so long will handwork be at a social disadvantage. Employers ought to see that no responsibility for the perpetuation of this reproach rests on their shoulders.

WATER AFFAIRS.

Value of Dartmoor as a Watershed.

The water-works engineer who takes a real interest in his professional duties can always find profitable employment in studying the meteorological peculiarities of his district. Superabundance of rain may bring upon him serious trouble; while, on the other hand, its long-continued absence, with a gradual lowering of his stores, may cause him no less serious anxiety. Rainfall and evaporation, therefore, are branches of the great subject of water supply which call for earnest attention. This is evidently the view taken by Mr. W. Ingham, the Borough Water Engineer of Torquay, who recently laid before the members of the Devonshire Association for the Advancement of Science, Literature, and Art, some statistics bearing upon these matters, which were presented in so attractive a form as to evoke from Sir Roper Lethbridge, the President, his personal thanks for what he characterized as one of the most interesting papers he had

ever heard. With the bulk of Mr. Ingham's communication we have no need to deal; but one portion of it claims notice, as it bears upon a larger question than the effect of rainfall upon the area with which the author is specially concerned. Devonshire is a rainy county, and it possesses in Dartmoor a vast gathering-ground for water 240 square miles in extent, according to Mr. Ingham's estimate. When it rains on the moor, it does so in real earnest, as those who have journeyed over it, especially the south-west portion, very well know. Mr. Ingham puts the mean rainfall at 55 inches per annum; and, working on this figure, he makes the total fall, in round figures, 190,000 million gallons. Assuming the population of Devonshire to be 650,000, the quantity of water used, at 25 gallons per head per day, would be about 5960 million gallons yearly. This is a very small proportion of the total fall; and even estimating that at half the quantity stated above, or 95,000 million gallons, there would be enough, according to Mr. Ingham, to supply nearly 10½ million persons with 25 gallons per head daily. Under these conditions—and this is the point in his paper which we wish to bring out—Devonshire need not, he said, "be afraid of inviting London to partake of its supply of "pure water."

Control of the National Water Supply.

THE suggested invitation to London to utilize some of the surplus water furnished by Dartmoor, alluded to in the preceding paragraph, was not acquiesced in by Mr. Ingham's auditory. In fact, there was a general agreement among the speakers that Dartmoor should be retained for the supply of Devonshire. The tenor of the discussion was that watershed areas should be conserved for the use of the populations residing in their immediate vicinity. The remarks made had the effect of drawing from a county gentleman an interesting contribution to the discussion in the shape of a letter to a local newspaper. The writer showed himself to be thoroughly conversant with the law in regard to underground water; and, while recognizing that, owing to the pressure of increasing populations and growing industries, those who are responsible for the supply of water frequently find themselves compelled to compete with others for distant sources —to their own disadvantage, and possibly to the detriment of communities to whom such sources are proximate—he thinks this "first come first served" method of appropriating water can only lead ultimately to "intolerable results." The total water supply of the country is limited in quantity; and he considers that the problem to be solved is the partitioning of it equitably "among all who can show sufficient "ground for claiming a share of it."

The idea is by no means a new one; but who is to undertake the "partitioning" task? The British Association of Water-Works Engineers have given a great deal of consideration to the subject; but the result of their labours has, up to now, only been the adoption of a series of useful suggestions by their Water Boards Committee. There are at present, as the Committee have pointed out, four independent public authorities who share the control of water undertakings; and the effect of this division of power is to make consistent legislation difficult, if not impossible. The existing condition of things is admittedly unsatisfactory. What appears to be wanted, in the opinion of many—the writer above referred to among the number—is a new administrative department of the Government, to take over the control and supervision of the water supply of the entire kingdom, on the basis of a code sanctioned by Parliament, to whom, of course, the department would be responsible. It may be remembered that Professor Percy F. Frankland, speaking at the Public Health Congress in Aberdeen about this time last year, urged the necessity for the creation of an Imperial Board of Health, somewhat on the lines of the Massachusetts Board, having at its head a Minister with Cabinet rank. The primary object of such a Board would be the systematic prosecution of scientific inquiries connected with hygiene; but possibly its functions could be so enlarged as to include the control of the national water supply. If so, it might be within the range of practical politics to confer upon it such supervisory powers in regard to the London water undertakings as to effectually safeguard the public, where additional protection is considered to be needed, without taking the works out of the hands of their present owners. In such circumstances, the creation of a separate Water Board would be unnecessary. The suggestions here thrown out may be worth consideration in the vacation time upon which we have entered.

ESSAYS AND REVIEWS.

ON BEING IN AUTHORITY.

FIRE and water are not the only good servants that make bad masters; for many a good private is as an officer a complete failure. Certain qualities are essential to the leader that are not looked for in the follower. Self-reliance, ability to choose and carry out a policy, powers of organization, the gift of exercising without abusing authority—these are some of the many qualifications that a follower may but a leader must possess. Those of us who have, or look to have, the wielding of authority in considerable places in the gas world would do well to take stock of ourselves sometimes in regard to these and other necessary qualifications, and to see what our ideals are or were, and how far we have drifted from them. The advice of Bacon is good: "In the discharge of thy place, set before thee the best examples, for imitation is a globe of precepts; and after a time set before thee thine own example and examine thyself strictly, whether thou didst not best at first." How many of us can ask ourselves that question without self-reproach?

What then are the qualifications of our ideal "chief?" First, obviously, knowledge of his business. If he be a departmental chief, he must—to command the respect of his subordinates, and to adequately fulfil his duty—know more of his particular branch of the business than anyone else in it, and must, moreover, have a sufficiently thorough knowledge of the affairs of the concern as a whole to appreciate rightly the effect upon the complete organization of any occurrence in his own special section. If he be the ultimate chief—the general manager—he must have a thorough grasp of the machine as a whole, with sufficient knowledge of the work of each department to know what kind of man is needed to work it, to know whether the man in charge is working it as efficiently as possible, and to be able to give advice when needful.

Another essential qualification of a chief is suggested by the foregoing. The ideal leader does not give advice or instructions to his subordinates for the sake of doing so. He chooses the right men for the positions subordinate to his, and then gives them as far as possible a free hand in carrying out the general policy laid down by him. Nothing causes more friction, nothing leads to a greater wasting of ability, to more apathy and indifference, than undue interference in matters of detail. The man who is allowed to do nothing on his own responsibility, or in his own way, loses the capacity to do anything. Leaning always on crutches the muscles in his mental legs become incapable of supporting him unaided. Snubbed if he attempts to initiate departmental reform, he will do nothing but what he is told; and, since it is impossible for the man who should be steering the ship to attend to every detail of her machinery, everything will be in turn neglected. If, indeed, the man who should be directing the course of the ship leaves the deck to interfere with the details of the engine-room work, the vessel is likely to run among the breakers, and is certain to make a bad course. The leader must have judgment in choosing his lieutenants; then faith, and a sense of proportion. A general manager should not lick postage stamps.

That a chief should possess industry might seem hardly to require saying. The foreman who never takes off his coat does not get the best work out of his men; and the head of an office or a works who wants his subordinates to display zeal, application, and interest in their duties, to their fullest capacity, must set the example. That should not need saying; but it does. The man who on attaining high office acts on the principle that when he was under orders he had to work hard, but now he means to let others do his work for him, is not unknown; but he does not receive the faithful and willing service of those others, nor does he receive or deserve their respect. But the man who displays devotion to the service he is in, can lead where another cannot drive.

The ideal chief must have consideration and sympathy for his servants—remembering that they are human beings with individual temperaments, not automatic machines. Beaconsfield endeared himself to many a follower by a timely inquiry as to "the old complaint," and the head of a business house should be careful to remember that a few words to a subordinate revealing that he is looked upon as something higher than a mere source of profit, that his health or ill-health is a matter of some concern other than in respect to the convenience of the business, are cherished and remembered years after the speaker has forgotten them. Kindly consideration for his dependants hall-marks a man as a gentleman, than whom no one is better served.

Equability is a valuable possession for one who has to lead. The merely human man cannot, it is true, always rise superior to his natural disposition, nor to the effects of a disordered liver. But those in authority should endeavour to avoid any semblance of capriciousness. "Seek to make thy course regular," wrote Bacon, "that men may know beforehand what they may expect. But be not too positive and peremptory; and express thyself well when thou digressest from thy rule." Uniform severity towards misconduct or error men can endure, respect, and, indeed, approve; but the uncertain man of caprice and whim is always an abomination.

The chief who would deserve the good opinion and respect of his subordinates must look upon favouritism as a deadly sin. It is one of the most obvious, and most insidious, forms of injustice,

and "injustice is no less than high treason against heaven." It is so easy to persuade one's self that the man who is most acceptable to one personally, who jars least upon one's individuality, is the best man judged from the point of view of the general interests of the business; but it is by no means always the case. It is well, too, to remember that "omissions no less than commissions are oftentimes part of injustice."

A further gift desirable in the leader of men—a qualification absolutely essential to success in business—is that of dispatch. Nothing hinders the work of any department of business more than procrastination or indecision on the part of its chief. That, of course, is not to say that the rapidity with which a judgment is formed is the only test of ability; the quality is the supreme test, and "affected dispatch"—a decision made without due consideration—"is one of the most dangerous things to business that can be." Granted that, a warning may still be given with some emphasis against the postponement of a decision on questions of business policy until the opportunity for action has gone. It is better to be sometimes wrong than always too late. To look at all sides of a question is well; but some men keep walking round and round until they do not know from what point they started or where they stand. Such men ought not to be in authority.

The wise chief will listen to the suggestions of those under him, and encourage the offering of them. He will also give credit to whom it is due—what so many men of set-purpose neglect to do, forgetting that the ultimate credit of successful management rests upon the head. Lord Roberts has persistently attributed the success of his campaign in South Africa to the efforts and abilities of officers and men under his command. Does the public think less or more of him on that account? And do not officers and men alike love their commander for his generosity?

The head of a business should always respect the position of those below him, as he himself looks for his position to be respected. If he decides upon some fresh policy affecting a particular department, he should take into his councils and invite the opinion of the chief of that department, if only as a matter of form. To once more quote Bacon: "If thou have colleagues respect them, and rather call them when they look not for it, than exclude them when they have reason to look to be called." It is well to make it a golden rule never to reprimand a senior subordinate in the presence of his juniors.

The ideal chief will be discriminating to a degree in awarding praise or blame. Praise should not be so lavished as to lose its value, but should be bestowed in such manner and degree as to afford the utmost encouragement. Blame should not be awarded hastily. Care must be taken to find the right shoulders to bear it; and due consideration should be given to all the circumstances. It is of the essence of discipline that a chief should never utter empty threats—that is to say threats which, upon repetition of the offence, he is not prepared to carry into execution. Nothing is more derogatory to authority. Above all, reproofs should be administered with gravity, without petulance, and without taunting.

Finally, to those in authority may be commended the advice of the great Emperor Marcus Aurelius: "Have a care you have not too much of the Cæsar in you, and that you are not dyed with that dye. This is easily learned, therefore guard against the infection. . . . Be always enterprising and vigorous in your business. . . . Do everything as a disciple of Antoninus. Imitate him in the vigour and constancy of his good conduct, in the equality, sweetness and piety of his temper, the serenity of his aspect, his contempt of fame, and the generous ambition he had to be perfectly master of his business. . . . He was a great judge of men and manners, but of no reprimanding humour; not at all to be frighted; not too suspicious. . . . He gave his courtiers all the freedom imaginable to contradict him, and was pleased with the proposal of a better expedient than his own."

ELECTRIC LIGHTING MEMORANDA.

The Underground Railways of London—Report of the Joint Committee—Our Forecast—Underground Tramways—The Shallow Subway System—The Sad Case of the Ediswan Company.

THE report of the Parliamentary Committee on prospective London underground railways has been published; and it is a very instructive statement. It will have to be reckoned with by those who are specially concerned with the new Metropolitan transport services, and may well be read for its general interest by anyone who likes to know how the world wags. The Committee was a joint one of both Houses, and it took cognizance of all the Bills of the session proposing to make new "tube" railways in London. The reference differed in a very important respect from the usual rule of procedure, inasmuch as it expressly directed the Committee to consider improvements and alternatives. As most of our readers are well aware, Parliamentary Committees are usually not advisory bodies. They take the preamble of a Bill as it stands, and either accept or reject it. Promoters are supposed to know their own business best; and if Parliament does not approve of their proposals after these have been explained, the whole project of legislation fails. In the case of the planning of the new underground railways of London, however, a broader treatment was clearly desirable. Being the product of private enterprise, they were all conceived independently, and without any attempt at co-ordination in the public interest. A Joint Committee might very properly see whether this element could not be introduced.

In the case in point, the Committee thought themselves absolved from dealing with the particular Bills as an ordinary Committee would—going into the financial details, &c. Practically, they resolved themselves into a Committee of Instruction, charged rather with sifting out from the mass such schemes as ought to be promoted in the ordinary way in another session. The whole of the session has been very profitably occupied in this inquiry. Speaking generally, the Committee approve of the model of the Central London Railway and the feeding lines of the London United Tramways Company, as being the best mode of dealing with the present traffic and the probable requirements of an increasing population. They particularly use the expression "underground railway or underground tramway," which implies a very important distinction. An underground railway in a tube is the kind of transport arrangement which fills the public eye for the moment; and it was proposed by every one of the ten Bills submitted this year. It was shown in evidence, however, and was admitted, that underground railways on this system could not always pay, though made along routes which would be eminently serviceable to the general public. Where railways are required to act as pioneers in opening up new residential suburbs, they certainly would not pay at first, nor possibly for a long time. Consequently, respecting such lines the Committee make an important recommendation in the spirit of the "JOURNAL" suggestion of the 9th ult. It is that the City Corporation and the County Councils should be authorized either to construct lines or aid in their construction. Seeing that when the article referred to was written we could not possibly know what was in the mind of the Committee, our conclusion as to what would be the expedient thing to do in the circumstances brought before the Committee is a forecast of which we have some reason to be proud. Such powers would enable the Councils to encourage, by subsidy or otherwise, the prolongation of railways into districts thinly populated, and, therefore, suitable for the relief of congested town areas; whereas, in many cases at any rate, a company would not feel justified in extending their line until the population was already there.

With regard to the other class of works, distinguished by the Committee as "underground tramways," they state in their report that it was indirectly brought under their notice that there is a system of subways or shallow tunnels immediately under the surface of the roadways, which has been successfully developed and is in process of further extension both on the Continent and in America. They heard no evidence on this system; but, in view of the large amount of capital involved in the schemes now before Parliament, and the importance of utilizing it to the best advantage, the Committee recommended that an early inquiry should be made into its merits by the Board of Trade. This recommendation, again, is another novelty, inasmuch as it has not been the practice of the Board to institute inquiries into matters that are not actually submitted to the Department in the form of schemes. We scarcely think it will be worth while to depart from this sensible rule in the present situation of the London transport problem. Meanwhile, two of the chief officers of the London County Council are under orders to proceed to America to look into this very system.

We have not hitherto mentioned this shallow subway construction in these columns, and the present will be a good opportunity for doing so, as more is certain to be heard of it in the near future. It is a plan designed to provide for rapid tramcar traffic along lines of thoroughfare congested with other traffic. Thus, where available, it is calculated to overcome the obstacle to satisfactory electric tramway working which we have recognized as existing in the main streets radiating from the Elephant and Castle. There is nothing very extraordinary about it. It is essentially a shallow subway, executed by the method of "cut and cover," with the crown not more than a couple of feet or so below the surface of the road. It is the plan adopted for the Paris underground railway; and there is a four-track line of the kind now in process of construction along Broadway, New York, called the Rapid Transit Railway. Obviously, it makes large demands upon the subsoil accommodation, and involves serious interference with pipes and drains. Yet it probably offers a feasible solution of the problem of rapid transit, where the local circumstances permit of its use. Query: Could such a subway be made from Westminster Bridge to the Canal Bridge in the Old Kent Road? That is the point to which the London County Council officials may be expected to address themselves when they come home. A nice pickle the street mains are likely to be in, with all these electric traction schemes going!

The conviction that electrical trading concerns are not exempt from the weakness and folly that unhappily marks so much of the history of the big industrial companies of this country, can be regarded as established by what transpired at the recent meeting of the Edison and Swan Company. It is unnecessary here to say anything of the nature of the business carried on by this Company, founded to exploit one of the most paying inventions of modern times. The public supplied the capital, and were willing to buy the Company's manufactures. But, as usual, the directorate was scandalously inefficient. The Company have been robbed through thick and thin, the amount hitherto ascertained being about £120,000; and, of course, the Directors never found it out. One is inclined to wonder whether directors, under the English company system, are really and truly of any use whatsoever. A Chairman seems to be chosen for his ability to speak

at a public meeting; and the Chairman of this particular Company has the reputation of being at the head of his profession. Still, the Company went from bad to worse, until the value of the shares dropped from £3 to 5s. Then the shareholders arose in their anger, and proceeded to deal with the old Directors. The administration has been abominably bad; and there is no Act of Parliament to stand between bad management and its natural consequence. Mr. Swan, personally, is understood to believe in the Company and in the future of the high-voltage lamp, which has admittedly given trouble in the past.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 467.)

It is gratifying to be able to record a marked improvement in the Stock Markets after the dullness which so long possessed them. Cheerfulness and buoyancy last week was the characteristic throughout, largely promoted by the condition of the Money Market, and by a happier frame of mind regarding South African affairs. There was active buying of all sorts, both by the investing public and by repurchasing "bears." Prices everywhere throughout the list show advances more or less considerable, despite a little realization towards the close. The settlement was got through, though not without one small mishap. The Money Market was extremely easy, there being an abundant supply to meet all requirements; and the discount rates relaxed materially. Business in the Gas Market was, on the whole, decidedly quiet. On one or two days, there was a faint glimmer of animation; but on others there was scarcely a single bargain marked. The tone, however, was firm and steady, and what changes of quotation did take place were all in the upward direction. Gaslight issues were only very moderately dealt in; and they afforded no sign of any approaching movement. The price was about 93¼ with the dividend, and about 91½ when it was marked *ex div.* Towards the close, there was some dealing in the secured issues; the preference being most in demand, and gaining an advance of a point. South Metropolitan was a little dealt in daily; and the price was very steady—being 126½ with the dividend, and 124 when the dividend was out of it. The debenture stock, however, rose a point. Commercials had no business done, except one bargain marked "special." Transactions in the Suburban and Provincial group were extremely limited in the London market; but a good many issues were marked *ex div.*, and nearly all of them improved their prices by the change. In the local market, Sheffield issues were all higher. In the Continental Companies, there was extremely limited business; but the tone was good. Imperial changed hands two or three times at top price; and there was a recovery of a couple of points in Union preference. The undertakings located in the remoter world presented no feature calling for remark. Business in the Water Companies was fair, all things considered, and the tone was good; there being several small advances in quotation, and no retrograde movement. The New River dividend comes out worse by nearly the rate of 1 per cent. per annum (9s. 5d. for the half year, to be exact); but the quotation did not suffer for it.

The daily operations were not of a magnitude to demand particular record. The movements were as follows: On Tuesday, Lambeth 7½ per cents. moved up 2. On Wednesday, they again rose 2, the 10 per cents. 2½, and West Middlesex 1. On Thursday, Continental Union gained 2, and South Metropolitan debenture 1. On Saturday, Gaslight preference rose 1.

Motive Power from Lignite Gas.—In a recent number of "Stahl und Eisen," Herr F. Zeyringer discussed the question whether it would not be advantageous to directly employ, in special motors, the gas obtained from the distillation of lignite. The author remarks that with blast-furnace gas an average of at least 95 cubic feet of gas are required per horse-power-hour for motors of about 60 horse power, and 75 cubic feet for those of 1000 horse power; the heating value ranging from 850 to 950 calories per cubic metre (35·3 cubic feet). Analyses of various lignites demonstrated that the gas obtained by distilling them yielded 730 to 1000 calories per cubic metre. A cubic metre of gas obtained would correspond to an average of 12 oz. of lignite.

Tram Rails as Conductors of Electricity.—The question of the electrolytic action of currents upon gas and water pipes has been taken up by the "Engineering Review," an American trade paper. It appears that this evil is assuming very serious proportions across the Atlantic. In Norfolk, Virginia, the entire main system for both water and gas is being destroyed. Similar reports from Atalanta and Dallas furnish evidence that the ground currents are gradually dissolving all the buried pipes; and experiments in bonding rails to make them efficient conductors for return-currents have not given the results which the electrical engineers promised. Tests of 37 systems of bonding, carried out by Mr. E. E. Brownwell to determine the extent to which they increased the power of rails to hold a current against the tendency of the ground to draw it off and diffuse it, showed that their efficiency ranged from zero to 15 per cent. of that of the rails. In one city, it was found that from a line of 90-lb. rails which was carrying only 200 volts, 145 volts were lost in four miles. In another part of the same city, rails which should have been carrying 500 ampères only delivered 15.

WATER-GAS INSTALLATIONS ON THE STRACHE SYSTEM.

Recent communications on water gas—such as those made by Mr. T. Holgate and Herr Körting—have contained references to Dr. Strache's system of production; and for some years information has, from time to time, been given in the columns of the "Journal" of the researches of its indefatigable inventor. But so far the published matter relating to the system has been mostly based on theoretical considerations and experiments made on a small scale; and little has appeared as to plant erected on a working scale, and regarding the results obtained therefrom. As there are at the present time upwards of a dozen distinct plants on the Strache system in operation in various places on the Continent, it is desirable to give some details of the more important of these.

Actually but few working results have been made known; and even in cases where they are obtainable, it is for several reasons difficult to institute a comparison between them and the results obtained with water-gas plant such as we are familiar with in this country. The Strache plants are so far relatively small; and it is well known that a very much higher duty is obtained from a water-gas set designed to make from ½ to 1 million cubic feet of gas per diem than from one of less than a tenth that productive capacity. Hence it is necessarily unfair to the Strache system to compare its present results with the best or average results from the more extensively used systems. Moreover, the Strache plant has not yet been given an opportunity of dealing with fuel of even moderately good quality when appraised by English standards. Most of the work so far done with it has been with fuel which the pampered English gas engineer would reject as utterly worthless. It is evident, therefore, that the practical data at present available for the Strache system are unlikely to do anything like full justice to its capabilities.

The system is chiefly of interest to English gas engineers because it is the outcome of a meritorious attempt to utilize bituminous and other coal directly for the manufacture of water gas. There is evidently far greater scope for such a system than for one which can only use with advantage coke or anthracitic coal. Bearing in mind the nature of the bulk of the coal supply of this country, it is clear that a system which can directly convert bituminous coal into gas free from atmospheric nitrogen is likely to have a wider application than the present carbonization or water-gas processes, whether used either separately or in conjunction with one another, if the use of gas as a fuel in households and small factories continues to increase. The limit to the application of the carbonization process alone must evidently ultimately be reached when the coke produced can no longer be disposed of to advantage; while the application of the water-gas process alone must be limited by the supply of coke or anthracite. And if the demand for gas becomes so great that, in order to meet it, the two processes have to be carried on interdependently, evidently a method of conducting them simultaneously in one plant would be economically preferable to carrying them out in disjointed operations in two distinct plants.

Even without anticipating the supersession of the ordinary methods of making coal gas and water gas by a single more adaptable and comprehensive process for making gas of a composition intermediate between them direct from coal and steam, it is evident from the fact that a fuel gas scheme such as Dr. Mond's finds many powerful supporters, that there must be a good prospect for a process which will yield directly from coal a very large volume of gas of fully double the calorific power of Mond gas. If, moreover, the system should be found capable, like the Mond process, of dealing with slack, its prospects of success will be even still more promising. Now it appears that one modification of the Strache process renders it applicable to the gasification of slack; and it is certain that it has been applied to very inferior fuels of the brown coal or lignite class. In some respects, Dr. Mond seems to have followed Dr. Strache in the lines on which he developed his fuel-gas process—notably in the employment of the regenerative principle. Some of Dr. Naef's comprehensive schemes also seem to resemble Dr. Strache's in important particulars. It is clear, therefore, that the ideas which prompted Dr. Strache have appealed also to other inventors.

Dr. Strache's processes are naturally protected by letters patent in most countries; and abstracts of the English specifications have been given from time to time in our "Register of Patents." But as it is well known that an inventor often seeks protection for processes and methods which he subsequently abandons or does not forthwith develop, we propose to give briefly, without reference to the patents, some account of the plant and processes now actually exploited by Dr. Strache's Companies. Our information on these matters is gathered mainly from the catalogues and pamphlets issued by the Belgian Company—La Société Internationale du Gaz d'Eau, of Brussels.

Five types of plant are described, of which the first—Type A—is not so interesting on the score of novelty as are some of the others. It is shown in fig. 1 (p. 442), and is intended for the use of coke, anthracite, or wood, for the production of simple or uncarburetted water gas. A boiler, a blower, and a small motor for operating the latter are, of course, required. This type is stated to be intended primarily for use at gas-works having a surplus of coke,

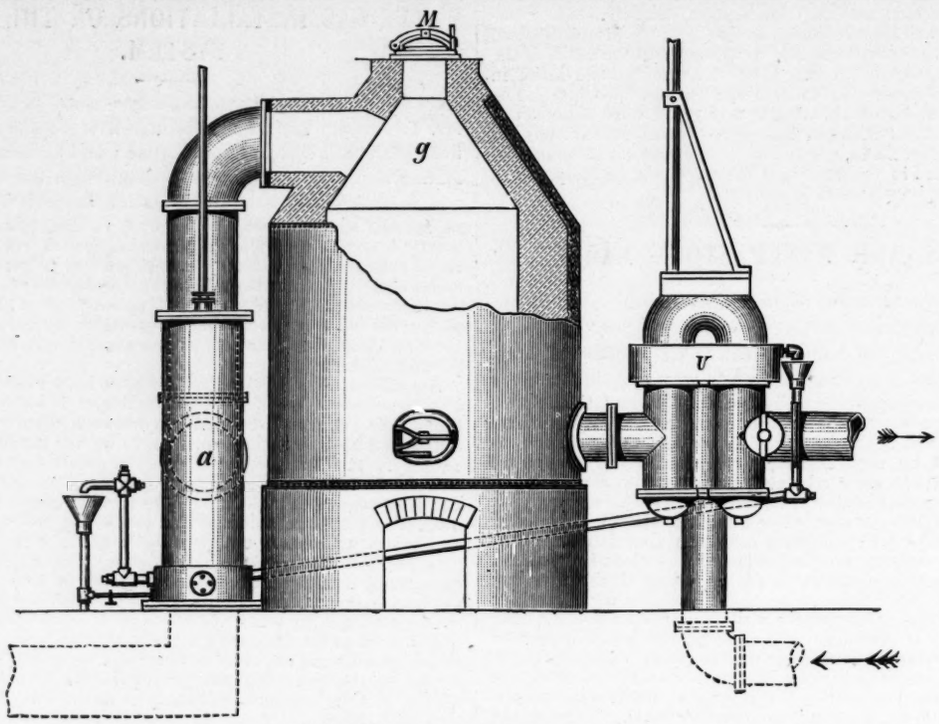


FIG. 1.—STRACHE WATER-GAS PLANT, TYPE A.

for the purpose of increasing the make of gas by means of the water gas, which can be afterwards carburetted with benzol.

The illustration renders a detailed description of the plant superfluous. The vertical cylinder lined with fire-brick forms the generator, which is charged with coke through the lid M. A three-way valve U allows the passage of the air required to burn a portion of the bed of coke, in order to provide the proper temperature; and the products of combustion pass away through the spent gas-valve *a* into the chimney. This valve is then shut, and the three-way valve U is reversed, so that steam injected into the upper part of the generator traverses the bed of fuel, with which it produces water gas, which passes through the valve U to the scrubber. The plant is said to be so planned and operated that complete decomposition of the steam takes place even at a low temperature; while during the blow, the carbon of the coke is converted almost solely into carbonic acid. The consumption of coke in continuous working is stated to amount to from 25 to 31¼ lbs. per 1000 cubic feet of water gas made. It is pointed out —evidently in all seriousness—that coke containing more than 30 per cent. of ash cannot be used in the plant with advantage. Perhaps Continental gas engineers are like some of their English brethren, of whom we have been told that they consider the water-gas generator the proper receptacle for all refuse fuel which cannot be disposed of in any other way! The generator of Type A is made in nine sizes, ranging in height from 3 ft. 10 in. to 16 ft., and in productive capacity from 176 to 17,660 cubic feet per hour.

The next style of generator—Type B—is intended to deal more particularly with poor coal or lignite. In this type, a superheater is embodied, and hence the plant is more expensive than Type A. It may perhaps be considered as the typical Strache plant. It is especially economical in continuous work, as raising the heats after an interruption of work entails a greater consumption of fuel than is the case with Type A. Referring to fig. 3, which shows another type of plant in which the essential parts of Type B are embodied, the generator G comprises two parts, the upper of which, g_2, contains the coal or lignite; and the lower, g_1, coke formed therefrom. There are two outlets for gas from the generator—viz., O at the top of the bed of coal, and O_1 at the top of the bed of coke. The distributing valve *r* allows either of these outlets to be shut off.

At the start, the generator is filled with coke, which is raised to incandescence by the air-blast. The valve *r* is set so that it closes the upper opening O; and the producer gas which is formed is thereby compelled to pass through the lower opening O^1 into the superheater R, where it is burnt by means of secondary air admitted through U. The heat liberated by this combustion is stored up in the fire-brick passages of the superheater, which thus attain a white heat at the top, and a cherry red heat a little lower down. The products of combustion pass off either into the chimney or into a special superheater for the air supply, which will be again referred to. When the fuel has been raised to the proper temperature, the air-blast to the generator is shut off, as well as the outlet for the products of combustion and the secondary air-inlet U^1; while the distributing valve *r* is moved so that it closes the lower outlet O^1, and leaves the upper outlet O open. Coal is charged through the air-locked hopper T into the generator, to replace the coke consumed during the blow. The make of water gas is then started by admitting steam at the base of the superheater, in passing up which it acquires a very high temperature. The steam, thus superheated, passes through O into the coal which has just been admitted to the generator, and carbonizes it. The coke thereby formed gradually drops down into the lower part of the generator, while the distillation products of the coal—viz., coal gas, tar, and ammonia—pass through the bed of coke in g_1 in company with the steam. The coal gas and the tar are converted into carbon and hydrogen; and the ammonia and other nitrogenous bodies are decomposed into nitrogen and hydrogen, or nitrogen, hydrogen, and carbon. The superheated steam is decomposed by the incandescent coke, and water gas is produced. The gas leaves the generator by an opening near its base, and passes through the valve U to the scrubber.

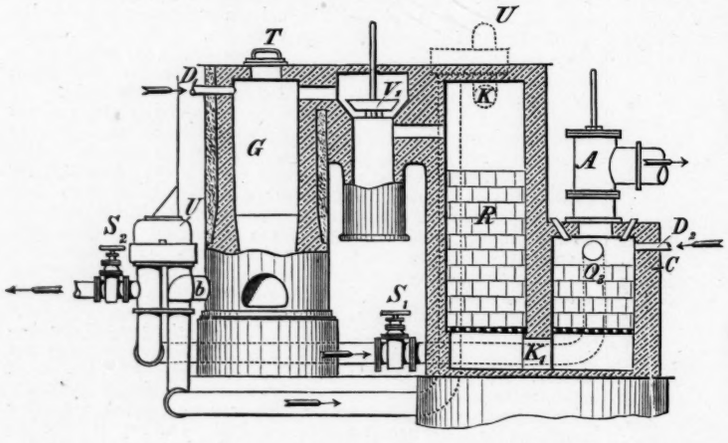


FIG. 2.—STRACHE WATER-GAS PLANT, TYPE C.

The production of gas is said to occur in three stages—viz., (1) The distillation of the coal, and formation of coke. (2) The decomposition of the distillation products, with the consequent formation of carbonic oxide and hydrogen (with a little nitrogen). This change involves a considerable increase in the volume of gas—for instance, one volume of marsh gas yields two volumes of hydrogen; thus $CH_4 = C + 2H_2$. (3) The formation of water gas from the coke produced by the distillation of the coal.

During the first two stages, 100 lbs. of coal are said to yield about 720 cubic feet of hydrogen, and 60 lbs. of coke, which is converted, in the last

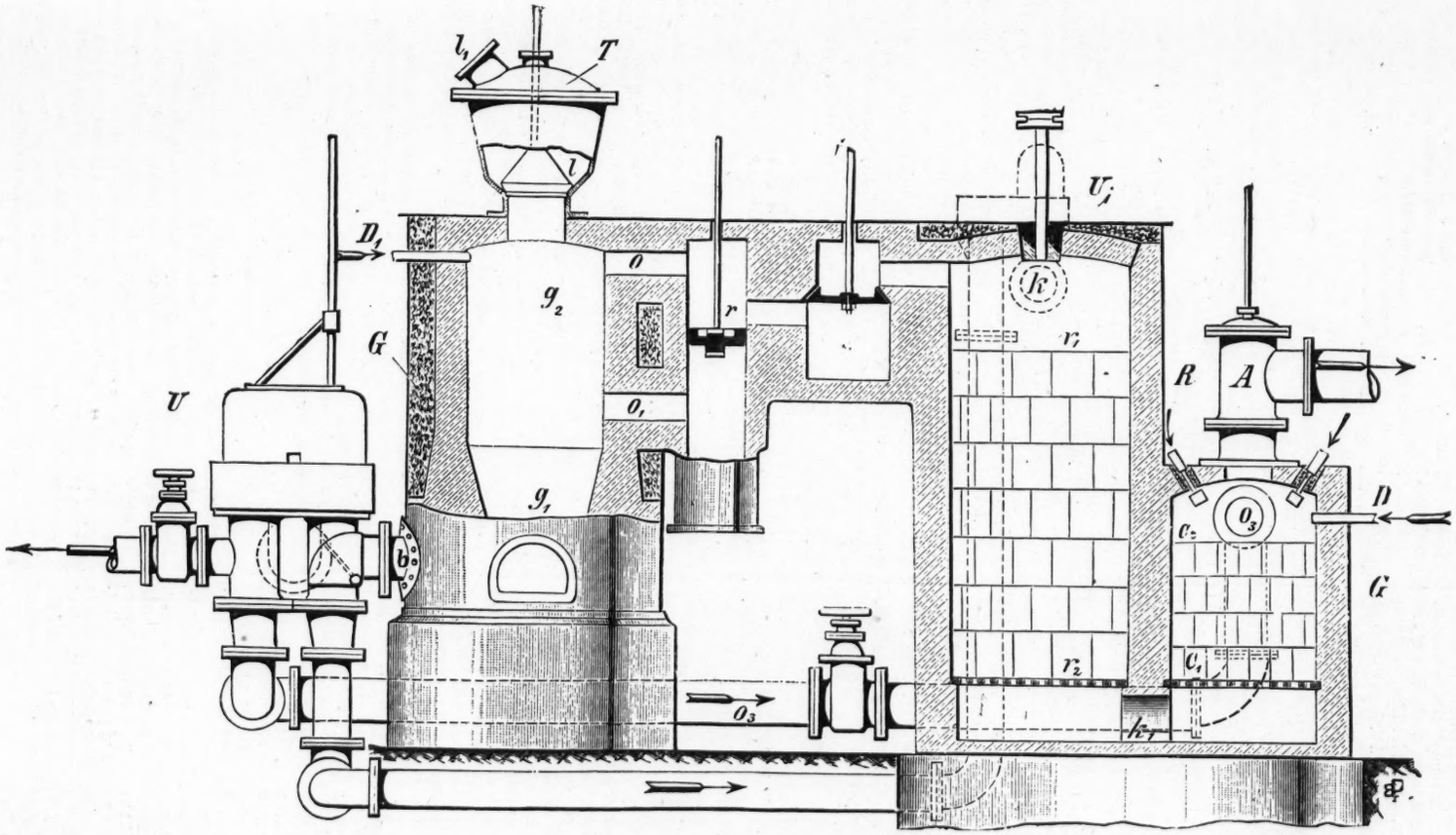


FIG. 3.—STRACHE WATER-GAS PLANT, TYPE D.

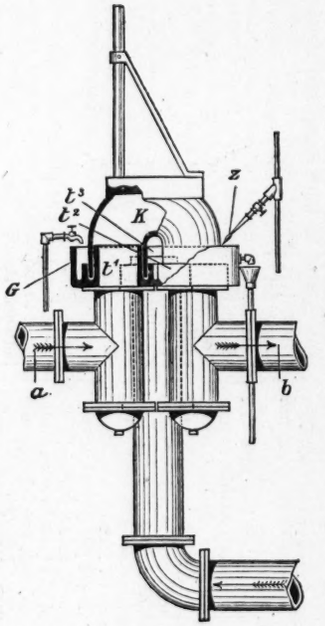


FIG. 4.—REVERSING VALVE.

stage, in the lower part of the generator, into 2400 cubic feet of a mixture of equal volumes of carbonic oxide and hydrogen. There are also formed small quantities of carbonic acid and nitrogen; so that ultimately every 100 lbs. of coal will have yielded about 3365 cubic feet of gas. The tar is stated to be decomposed so thoroughly that the scrubber liquor has a scarcely detectable odour of tar. On the other hand, the scrubber liquor is rendered black by the fine particles of carbon which result from the decomposition of the hydrocarbons. The decomposition of the ammonia is so thorough that the scrubber liquor gives no evidence of its presence.

This type of plant, as already stated, can use various descriptions of fuel, provided they do not cake or bind together too freely. The consumption of carbon, per 1000 cubic feet of gas made, is stated to be from 21·8 to 28 lbs., when coal or coke is used; and from 31·2 to 43·7 lbs. when lignite is employed. Even peat can be dealt with in this generator. The heats should, in the first instance, always be raised by means of coke; but afterwards the particular fuel selected should be used without any coke. It should be in lumps nearly the size of the fist, and should not contain more than 20 per cent. of ash. The B type of plant is designed in seven sizes, for outputs ranging from 880 to 17,660 cubic feet per hour. The heights of the different sizes of plant range from 12 feet to 16 ft. 8 in.; and their lengths—covering only the generator and superheater, and not the scrubber—from 7 ft. 3 in. to 24 feet.

Particulars of three series of trials with this type of plant are given. Apparently they are the trials to which Herr Joh. Körting referred when discussing the Strache process recently.* In the first series of two trials, each of seven hours' duration, coke from the Graz Gas-Works was used. It had the following average composition: Carbon 88·88, hydrogen 0·69, nitrogen and oxygen 1·56, sulphur 0·54, ash 7·52, and moisture 0·81 per cent. Its calorific power was 3343 calories per pound. The make of gas per hour was 1060 cubic feet in one, and 1200 cubic feet in the other trial; and the coke consumed amounted to 25 and 28·7 lbs. per 1000 cubic feet of gas made. The average make of gas per pound of carbon consumed in the two trials was 41·8 cubic feet. A heat-balance drawn up for one of the trials indicates that, of the total heating value of the coke consumed, 73·7 per cent. was

* See "JOURNAL," Vol. LXXVII., p. 1310.

represented in the heating value of the water gas, 6·5 per cent. in the sensible heat of the producer gas, 5·5 per cent. in the sensible heat of the water gas, and 14·3 per cent. in undecomposed steam and loss by radiation.

In the second series of five trials, ranging from four to seven hours in duration, Upper Silesian coal of a very friable nature was used. It had the following composition: Carbon 63·57, hydrogen 4·63, nitrogen 0·88, oxygen 18·50, sulphur 0·72, ash 2·60, and moisture 9·10 per cent. Its calorific power was 2622 calories per pound; and it yielded 57·12 per cent. of coke. The make of gas per hour varied in the different trials from 1000 to 1380 cubic feet; and the coal consumed per 1000 cubic feet of gas made, from 30½ to 40 lbs. The average make of gas per pound of carbon consumed in these five trials was 40·2 cubic feet. Heat-balances for four of the trials show that, of the total heating value of the coal consumed, from 67·1 to 78·9 per cent. was represented in the heating value of the water-gas obtained, from 8·7 to 10·5 per cent. in the sensible heat of the producer gas, from 4·9 to 5·8 per cent. in the sensible heat of the water gas, and from 6·6 to 17·5 per cent. in undecomposed steam and loss by radiation.

The third series comprised actually only one trial of five hours' duration, with Buchberg lignite, which contained 41·6 per cent. of carbon, 4·7 of hydrogen, 0·6 of nitrogen, 25·1 of oxygen, 0·3 of sulphur, 8·1 of ash, and 19·6 of moisture. Its calorific power was only 1677 calories per pound; and it yielded 51·33 per cent. of coke. The gas made per hour was 1480 cubic feet; and the lignite consumed per 1000 cubic feet of gas made amounted to 63·67 lbs. The make of gas per pound of carbon consumed was 30·4 cubic feet. The heat-balance indicated that, of the total heating value of the lignite consumed, 66·4 per cent. was represented in the heating value of the water gas made, 16·3 per cent. in the sensible heat of the producer gas, 4·9 per cent. in the sensible heat of the water gas, and 12·4 per cent. in undecomposed steam and loss by radiation.

The third plant—Type C—is shown in fig. 2. It is intended for the production of carburetted water gas. The water gas, formed in the generator, is saturated either with hydrocarbons produced and fixed by heat, or with benzene vapour in the cold. The selection of either of these two methods of carburetting the simple water gas must be made according to the prevailing prices of mineral oil and benzol; but if the carburetted gas is required, as is ordinarily the case, for addition to coal gas, in order readily to increase the output of a gas-works, there is a limit to the proportion of the gas carburetted with benzol which may be used—viz., about 30 per cent. of the volume of the coal gas. There is no such limit to the amount of water gas carburetted by means of mineral oil which may be employed for admixture with coal gas. In the figure, G is the generator, with charging-lid T, valve U admitting the primary air to the generator, superheater R, and vaporizing chamber C.

During the blow, the valve V^1 between the generator and superheater is open; and the producer gas formed passes into the superheater, where it is burnt by means of a supply of secondary air admitted through K. The passages in the fire-brick filling of the superheater are thereby raised to incandescence; while the brickwork in the vaporizing chamber C is also strongly heated. The spent gases escape through the valve A either direct to the chimney or to a superheater for the air supply. On changing from the blow to the make, the valve A and the valve V^1 are shut; and the valve U is turned so that the water gas passes from the generator to the vaporizing chamber C. Then steam is admitted to the upper part of the generator through D, and is converted into water gas, which passes through the valve U to the vaporizing chamber or carburettor C, in which mineral oil residue is injected. This oil vaporizes and mixes with the water gas which carries the vapours into the superheater, where they are gasified and fixed, and enter into permanent union with the water gas. The gas thus carburetted passes out by the valve U^1 to a tar separator and condenser, whence it goes to the gasholder.

If, on the other hand, gas carburetted with benzol is required, the valve S^1 is closed in the first place, so that the gas is passed direct through S^2 from the generator to the scrubber. The valve V^1 is kept open during the make; and steam is admitted through D^2 to the carburettor, and passes through the superheater or regenerator R to the generator. The water gas is carburetted with benzol after it leaves the scrubber.

This type of plant is stated to be produced in five sizes, ranging in productive capacity from 880 to 17,660 cubic feet per hour, and having practically the same dimensions as the corresponding sizes of Type B. The consumption of coke, when gas carburetted by means of mineral oil is being made, is said to be from 31¼ to 37½ lbs., and the consumption of oil from 25 to 31¼ lbs. per 1000 cubic feet. For the production of gas for carburetting with benzol, the consumption of coke is said to be from 22 to 28 lbs. per 1000 cubic feet of gas made. The coke used should not contain more than 30 per cent. in the state of dust.

The fourth plant—Type D—is shown in fig. 3, and is said to combine all the essential parts of Types B and C; so that coke, coal, or lignite may be used in the generator, and either simple water gas or water gas carburetted with mineral oil or with benzol may be produced at will. It therefore allows of the use of whatever raw material it is for the time being most advantageous to employ. The construction and method of working of the plant will be clear from the descriptions of Types B and C; and the consumption of the raw materials is also practically the same as with them.

The fifth plant—Type E—is of a more distinctive character. It is said to be both cheap and simple; but unfortunately full details of it are not given in any of the papers, catalogues, &c., before us. It does not require either a fan for the blast or a boiler, as the draught of the chimney is made to serve the purpose of the former, and water is evaporated within the generator. Moreover, this type of plant is stated to be capable of dealing with any description of fuel, even if it is in a state of powder or of a binding or caking nature. At present, only one pattern of this type is said to be manufactured, and that is for a make of from 350 to 700 cubic feet per hour. It is added, however, that the productive capacity of the plant depends very greatly on the draught of the chimney, and can be considerably increased by the aid of a small blower.

The five types of plant have now been described in sufficient detail to indicate the chief points of resemblance and difference between them. There are a few particulars common to them, which may now be given. The power required to furnish the blast ranges from ⅛ to 12 horse power for makes of gas ranging from 176 to 17,660 cubic feet per hour, in plants of Type A (and E, if a blower is used); and from ⅛ to 16 horse power in plants of Types B, C, and D. The steam required amounts to 37·45 lbs. per 1000 cubic feet of gas made. The generators are provided with regulators for controlling the rate of admission of the steam to them, with the object of preventing steam passing undecomposed through the bed of fuel. The steam ought to be at least at 2 atmospheres pressure.

A special valve (shown in fig. 4) is employed to prevent explosions when the change is made from the make to the blow. The ends of the ∩-shaped pipe at top are sealed in cups of mercury, one at the top of each upright pipe, kept cool by water circulation. When the change of operations is made, one end of this pipe is lifted from its seal and transferred to the vacant seal. The gas contained in the ∩-piece is simultaneously lighted at the flash-jet *Z*, so that only products of combustion remain in this connection; and they constitute an incombustible layer between the gas in the generator and the air of the blast. There is therefore no explosion when the blast is turned on. The construction of the valve renders the passage of gas into the blast-main quite impossible. All the valves are interlocked, to prevent wrong manipulation by the operator. A dust or ash catcher is provided.

The regenerators for pre-heating the air-supply, which have already been referred to, are recommended for use wherever economy of fuel is the predominant consideration and first cost of the plant of secondary importance. Plant of Type B, however, utilizes the heat so completely in its ordinary superheater—the waste gases being at a temperature not exceeding 480° Fahr.—that no additional regenerator for the air supply is recommended. But plants of Types A, C, and D discharge the waste gases at a considerably higher temperature, and the heat may be utilized for pre-heating the air supply. The air-heaters are made for plants of 1760 cubic feet per hour and upwards productive capacity. The size of the air-heater for a plant making 17,660 cubic feet per hour is 12 ft. 1½ in. long by 4 ft. 8 in. wide by 17 feet high; and its heating surface amounts to 1615 square feet.

The scrubbers for cooling and washing the water gas are made of different sizes for various sizes of generators; but two generators may connect to one scrubber. About 31 gallons of water are then required per 1000 cubic feet of gas passed through the scrubber. Sulphuretted hydrogen is removed from the gas by ordinary purifiers containing oxide, which is revivified *in situ*. A special apparatus is employed to remove iron carbonyl from the water gas. It consists of a vertical cylinder filled with pumice, which is supplied with concentrated sulphuric acid. This apparatus is used after the storage gasholder, and naturally not only removes iron compounds from the gas, but also dries it, and hence renders any subsequent deposition of moisture in the mains or services out of the question. This purification entails a consumption of 0·37 lb. of crude concentrated sulphuric acid per 1000 cubic feet of gas treated. The spent acid, however, is saleable as dilute sulphuric acid. A powerful odour is imparted to the gas by means of carbylamine, which is applied continuously in an apparatus devised by Dr. Jahoda. The consumption of carbylamine is said to amount to 13 grains per 1000 cubic feet of water gas.

In a complete installation for the supply of purified and odorized water gas, the various pieces of apparatus are connected in the following order: Superheater, generator, scrubber, tar-extractor, relief gasholder, oxide purifier, station meter, storage or distributing gasholder, sulphuric acid pumice tower, governor, and odorizing apparatus.

(*To be continued.*)

Production of Sulphate of Ammonia.—In the course of a report recently presented to the Foreign Office by Dr. F. Rose, His Majesty's Consul at Stuttgart, on "Chemical Instruction and the Chemical Industries in Germany," he points out, when dealing with nitrogenous compounds, that in 1872 Germany produced only 5000 tons of sulphate of ammonia out of the 42,000 tons made in Europe. In 1897, however, her production was 16,000 tons in the various gas-works, and 74,000 tons in the coke-ovens—together, 90,000 tons. He remarks that the 74,000 tons could probably be trebled if all the ammonia which is allowed to escape into the air during the formation of coke were utilized.

PERSONAL.

Mr. T. HAYNES, who has resigned the secretaryship of the Leatherhead Gas Company, has been appointed Managing-Director.

Mr. JOHN GIBB has resigned the position of Manager to the Kirkintilloch Gas Commissioners, having obtained a similar appointment at Newton-on-Ayr.

Mr. HAROLD DAVIES, Assistant-Engineer at the Blackburn Gas-Works, was married last Tuesday at the Baptist Chapel, Darwen, to Miss Winifred Earl, daughter of Mr. C. Earl, of the latter town. Among Mr. Davies's presents was a handsome case of cutlery from Mr. S. R. Ogden, the Corporation Gas Engineer, and a roll-top desk, subscribed for by clerks and employees at the works.

The employees at the gas-works of the Congleton Corporation have presented to Mr. WILLIAM ORME, the Manager, a handsome case of silver fish knives and forks in a polished oak case, as a small token of respect, on the occasion of his appointment to the management of the Quaker's Yard Gas and Water Company. Mr. Orme, when acknowledging the gift, thanked the men for the cordiality with which they had always done their work, and expressed his regret at severing his connection with them.

Mr. SMITH, the General Foreman of the Poplar Works of the Commercial Gas Company, has just retired, after serving in that capacity for the last 24 years; and, as a token of the esteem and respect in which he was held, he was last Thursday presented with a handsome marble timepiece and ornaments, suitably inscribed. Mr. S. W. Ludbrook, supported by Mr. J. B. Kent and Mr. Stanley Jones, made the presentation on behalf of the subscribers, and expressed the hope that Mr. Smith might be spared for many years to enjoy his retirement.

OBITUARY.

The death is announced, at the comparatively early age of 58, of Mr. T. FORRETT, Manager of the Alfreton Gas Company.

We regret to learn of the death of Mr. THORNTON WHITE, elder son of the late Mr. T. W. R. White, of Sherborne. Deceased was for some time Manager of the Woodstock Gas-Works, Cape Town. It may be remembered that he was abroad at the time of his father's funeral last November. He returned from the Cape about three weeks ago, and died on Monday evening last week. His health had not been good for some time previously. The funeral took place last Thursday at Poole Cemetery.

The Managing-Director of the firm of A. & J. Stewart and Menzies, Limited, tube manufacturers—ANDREW STEWART, Esq., LL.D., of Glasgow—died at his residence, Kingsmeadows, Peebles, last Friday, after a painfully acute malady of eighteen months' duration. Mr. Stewart began life in a small way 41 years ago; and the Company of which he was the head are now the owners of nine engineering and tube works. The capacity of the several establishments under the control of the Company is such that they can supply 378 miles of gas piping per week. Mr. Stewart was of philanthropic bent of mind, taking an interest in many institutions in Glasgow. He was founder of the Chair of Political Economy in Glasgow University.

We regret to record the death last Thursday, at Ewell Castle, Surrey, of Mr. AUGUSTUS WILLIAM GADESDEN, who was for some years Chairman of the East London Water-Works Company. In the autumn of 1891, Mr. Gadesden, had a serious illness, which prevented him from presiding at the half-yearly meeting of the Company—his place being taken by Mr. G. Banbury; and though he was able to be present at the assembly of proprietors in the following spring, he could not occupy the chair. Ill-health compelled him in 1893 to resign his position, which was filled by Mr. Banbury until three years ago. The late Mr. Gadesden was a sugar refiner in Whitechapel and St. George's-in-the-East. In addition to being a Director of the East London Water Company, he was for some years upon the Board of the London and Westminster Bank, and was connected with other undertakings—being twice Prime Warden of the Goldsmiths' Company. He was a Justice of the Peace for the counties of Surrey and Middlesex, and Chairman of the Tower Division of the latter county till merged in the new County of London. He was a Deputy-Lieutenant for Middlesex and the Tower Liberty, and had been High Sheriff of Surrey.

NOTES.

Disuse of British Canals for Coal Transport.

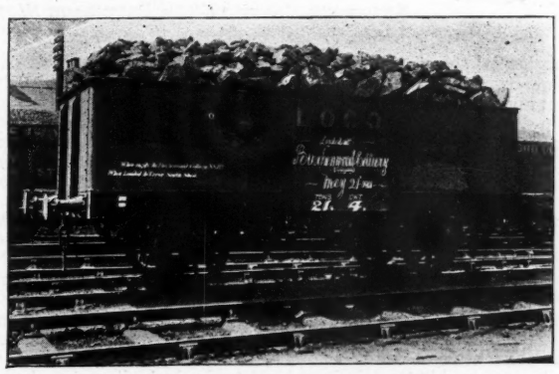
The question which is occasionally asked, as to why canal transport for bulky and heavy merchandise is so neglected in the greater part of the United Kingdom, is suggested once more by the recently published Board of Trade returns relating to the world's production of coal. It is there stated for the first time that of the total quantity brought to London, a little more than one-half comes by sea, coastwise, and nearly the whole of the balance by rail; only 15,484 tons reaching the Metropolis by canal in 1899. This is a statement that appears to call for some explanation, inasmuch as many—perhaps most—of the coal wharves of London are on lines of inland navigation. In view of the excellent and cheap canal services of France and Germany, over which enormous freights of coal and other minerals and metals are continuously passing, it appears strange that canal transport in England should remain limited to certain localities and uses. Especially is it noteworthy that the enormous growth of London should not be accompanied by any corresponding development of canal making, either on the north or the south of the River Thames. This is a matter upon which inquiry by the county authorities would not be thrown away.

Mechanically Intensified Combustion.

A curious device for intensifying the combustion of fuel in furnaces by feeding it with oxygenated air, obtained by a purely mechanical process, is reputed to have been invented by Signor Mazza, an Italian engineer. The machine employed for this purpose is merely a centrifugal separator. On passing air into this machine, the oxygen molecules, which are heavier than the nitrogen with which they are associated, tend to concentrate at the periphery of the pan, like cream from milk; so that on drawing off the air from this surface, it is found to be considerably richer in oxygen than common air. Indeed, it is claimed that the oxygen content of this air can be readily brought up to 26 per cent. This, of course, is a considerable gain. Moreover, the centrifugal machine acts at the same time as a blowing-pan; the enriched air being delivered under a slight positive pressure, while the impoverished air is expelled continuously from near the axis of the machine. About 2-horse power is absorbed in driving a separator capable of delivering 18,000 cubic feet of enriched air per hour. If utilized in a boiler furnace, air thus surcharged with oxygen has improved the evaporation per pound of coal from 9·5 lbs. of water to more than 12 lbs., with the Mazza apparatus.

A Twenty-Ton Coal-Waggon.

We give below an illustration of a 20-ton locomotive coal-waggon constructed by Mr. W. Webb, Chief Mechanical Engineer of the London and North-Western Railway Company. It is one of a number which have been for some time running to the Birchenwood Collieries, Kidsgrove, and making two journeys per week. Its dimensions are 21 feet long, 7 ft. 9 in. wide, and 4 ft. 3 in. deep. It is provided with side doors, and all the plates



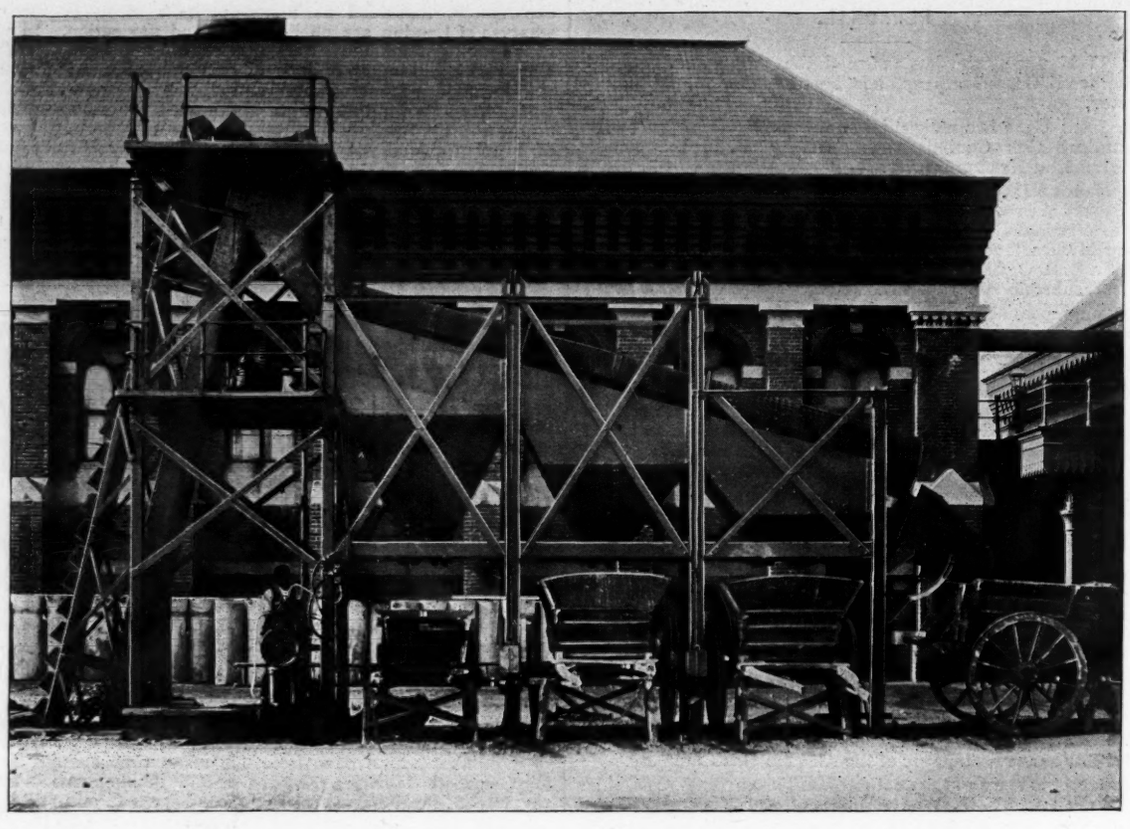
are arranged and fitted together to strengthen the waggon, and make it easy of repair. We are informed that its estimated cost, assuming steel and iron to be normal in price, is little more than that of an ordinary 10-ton coal-waggon; and as its carrying capacity is twice as great, and less shunting is required, it commends itself to the notice of coal conveyors. A good feature of the waggon is the fact that its tare is only 7 tons 17 cwt., which compares very favourably with waggons of less capacity.

TECHNICAL RECORD.

SCREENING PLANT AT BRIGHTON GAS-WORKS.

In the account of the visit of the members of the Société Technique du Gaz en France to the Portslade works of the Brighton and Hove Gas Company which appeared in the "JOURNAL" on the 30th ult. (p. 263), reference was made to the rotary screen erected there for sorting and screening the clinker and ashes from the water-gas plant and the retort-furnaces. It was then mentioned that the screen had been designed by Mr. Joseph Cash, M.Inst.C.E., the Chief Engineer of the Company, and erected by Messrs. Graham, Morton, and Co., of Leeds. As the plant was generally admired by the French visitors, and as many of their English colleagues may be interested in it, we give a more detailed description of the screen, with an illustration (p. 446) showing its general arrangement.

The plant consists of one wrought-iron built-up hopper, with special flap-door feed. The sides of the hopper are made of quarter steel plate, and are flanged and riveted at the ends to form a



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SCREENING PLANT AT THE PORTSLADE WORKS OF THE BRIGHTON AND HOVE GAS COMPANY.

substantial structure. On each side of the hopper are riveted angle-irons, supported on channel-irons fixed in the walls of the pit; and on the bottom of the hopper is fixed the improved patent flap-door feed for regulating the charge or amount of material per bucket. At this point the boot of the 18-inch continuous bucket elevator is fixed. This elevator, which measures 28 ft. 6 in. from centre to centre of the sprocket wheels, consists of a wrought-iron structure, lattice braced, and arranged with adjustable slides and screws for varying the length of the chain. At the bottom of the boot of the elevator is riveted a strong angle-iron, for attaching to the concrete foundations. The back of the elevator is supplied with a steel plate $\frac{1}{8}$ inch thick for guarding the buckets on their return side, and also for collecting any material which may drop from them, and conducting it to the boot of the elevator. Each of the runners is covered with greenheart wood liners, for reducing the noise while at work.

The top and bottom fittings consist of 3-inch diameter shafts, with two sprocket wheels keyed to each; the top shaft being provided with pedestals and loose collars, with extension for keying the gearing thereto. The bottom shaft is provided with the necessary adjustable blocks and screws. There are two strands of steel roller-chain, to which are attached the elevator buckets, which are pitched 12 inches apart. These buckets are of the continuous type—*i.e.*, the lip of one bucket is joggled to project over the trailing portion of its predecessor; thus forming a continuous band of plates and buckets, and preventing the small gritty clinker from getting into the working portions of the elevator. At the head of the elevator is arranged a built-up wrought-iron hopper, with extension shoot for delivering the material into the screen; the whole being attached to the elevator casing, and forming part of it.

The screen is 2 ft. 6 in. diameter and 22 ft. 6 in. long, built up of perforated plate and angle-iron runners, and stiffened longitudinally also by angle-iron. Inside this screen is fitted a spiral coil, to prevent the material from travelling too quickly throughout the length of the screen. At the top is arranged a specially shaped wheel ring, by which the screen is driven. The latter is supported on a hinged joint at the top, and at three movable points along its length; the bottom being raised by means of a screw-and-bevel gear, and the two intermediate points being balanced with cast-iron weights attached to the lifting bars by means of chains passed over cast-iron pulleys supported at the top of the columns, as shown in the illustration. The intermediate and end supports for the screen consist of brackets and rollers; thus reducing the friction for revolving the screen.

For the three different sizes of screenings, there are provided three built-up wrought-iron hoppers of suitable form to catch and store their respective sizes. At the bottom of each hopper is arranged an opening, with slides and levers complete; and each slide is connected with a hand lever in a convenient position. At the end of the screen is arranged a swinging shoot, which is built up of wrought-iron plate, and hinged to a fulcrum bracket supported on a structure, and also by means of angle-iron brackets with pin and chain. The structure for the plant consists of ten 6 inch by 5 inch rolled steel joist columns with channel-iron and joist cross-bars, the whole riveted together and well cross-braced so as to be extra substantial.

On the shaft of the water motor which drives the plant is keyed a 10-inch diameter bevel wheel, driving on to a 2 ft. 3 in. diameter bevel wheel keyed on the vertical shaft, which is about 14 feet long, supported at the bottom in a footstep, and at the top by means of a pedestal. The shaft transmits its motion to the revolving screen and elevator by means of bevel gear.

It will be seen by the illustration that there are four different sizes of material. The smallest size or breeze passes through the first portion of the screen, and the larger sizes in the next portions—the clinker falling out of the end. We are informed that Mr. Cash has found a market for the whole of the material which passes through this plant; and we must compliment him, not only upon his design, but also upon his idea of saving money out of what many other engineers throw on to the refuse pit.

The plant has a capacity of 50 tons per day; but at the present time it is doing considerably more. This testifies to the satisfactory manner in which the makers have carried out their work. Though designed primarily for gas-works there does not appear to be any reason for restricting its use to these establishments. It would be equally applicable to electric light or other works where long ranges of boilers are employed, and where the clinker contains a large quantity of unburnt fuel. We shall therefore not be surprised to find it more generally adopted as its capabilities become more widely known.

Position of English and Foreign Patentees.—The attention of the President of the Board of Trade was called last Thursday, by a notice placed upon the paper of the House of Commons by Mr. Joseph Lawrence, the member for the Monmouth Boroughs, to the conditions existing between this country and Germany and France in respect of the Patent Laws. At present, an Englishman who has patented an invention in Germany or France is obliged to manufacture his goods in one or other of these countries, or forfeit his patent; whereas a German or a Frenchman who takes out a patent in England can manufacture his goods wherever he pleases, and ship them to this country for disposal. In this way Germany and France get the benefit of new employments for their workpeople, while England has no such advantage. The only way in which the English manufacturer can protect himself is by buying up the foreign-owned rights in English patents, and erecting works in England. The object of the honourable member is to compel foreigners who wish to enjoy the protection of the British patent laws to build works in this country, and thus find employment for English people.

IRISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Dublin.

The Annual Meeting of the Irish Association was held in Dublin last Tuesday, in a spacious room in the Mansion House, the use of which was kindly granted by the Lord Mayor. There was a gratifyingly large attendance, both from North and South; this being the first gathering of members since the organization ceased to be called the North of Ireland Association.

Welcome by the Lord Mayor.

The Right Hon. the Lord Mayor (Mr. T. Harrington, M.P.) received the members in the supper-room. He said it was with very great pleasure that he welcomed them to the Mansion House, and expressed the hope that the deliberations on which they would be engaged would be a benefit, not merely to themselves personally, but to the profession at large, and to the various interests with which they were concerned. He was glad to see an Association such as theirs, representing so important a profession as that of gas engineering, coming together and consulting at a time when the science with which they were connected was making such marvellous progress in the world; and he thought it would be useful, not merely to themselves, but also in the highest degree to the country, that they should seize upon opportunities of this kind to consult with one another, and to keep their profession in Ireland abreast of the times. He knew they would have many questions of importance to debate there. The Association was not at present a very large one; but he was glad to know from his friend Mr. Cotton that it was a growing one; and he had not the slightest doubt that on the important questions to which their attention would be directed that day, and from time to time, the men in their profession in that country would be always able to give a good account of themselves, and take a creditable place in the discussion and consideration of the questions which affected them. Ireland gave to all countries in the world a very fair share of the talent in every employment, in every profession, and in every grade of life; and it might well, he thought, be said of Irishmen that in other countries they were much more at home in the exercise of their talents and of their intellects than they were in their own. This was because the country did not afford the same opportunities. But whether the training was for home or for foreign parts, it was of great interest to their profession that they should be brought frequently into touch with one another, so that they might freely interchange their opinions upon the various questions of the day. And it was more especially of importance to themselves, in all subjects that affected them, that safeguarded their profession, that enabled them to stand up for their own interests, where necessity arose, that they should have an understanding with one another, that they should be brought frequently into touch with one another, and be able to work together for their individual and professional interests. He had no intention of intruding on their time. He knew they would turn their attention to more serious and more important matters; and he only discharged what, to him, was the very pleasing duty of welcoming them to the Mansion House, and of expressing the hope that their deliberations would be useful, as he had said, not merely to themselves, but to the country at large, and that they would result in direct advantages to the profession to which they belonged, and to all its members.

His Honour then retired, and the President (Mr. W. A. Reid, of Longford) took the chair.

The President said he thought they were under a very deep debt of gratitude to the Right Hon. the Lord Mayor for doing them the great honour of being present, and opening their meeting. They were also much indebted to him for granting them the use of the very beautiful hall in which they were assembled for their meeting. He therefore asked the members to accord to his Honour their very heartiest thanks for his kindness in coming among them.

Mr. S. B. Langlands (Coleraine) seconded the proposal. He said the Lord Mayor had honoured them with his presence, and had spoken to them in a right friendly manner. His welcome had been hearty, as all Irish welcomes were; and they wished to show that they appreciated it.

Mr. J. Lyne (Wexford) said he had great pleasure in supporting the vote of thanks to the Lord Mayor—the more so since, if they were each in his native place, he would be a very near neighbour of his indeed. The Lord Mayor was one of the best of men—one of the "bright particular stars" who had distinguished themselves in the British House of Commons, and had done great service to the country.

The vote having been unanimously accorded,

The President asked Mr. Cotton to convey the thanks of the Association to the Lord Mayor for granting them the use of the hall and for opening the meeting.

Mr. T. J. Cotton (Inspector of Gas-Meters and Public Lighting for Dublin) said he should have great pleasure in doing so.

The Report and Accounts.

The Hon. Secretary (Mr. J. Whimster, of Armagh) read the report of the Committee. It stated that, in presenting the fourteenth report since the Association was formed—the first since adopting the new title of "Irish Association of Gas Managers"—they regretted that their circular of the 15th of May, soliciting papers for the meeting, had met with a very meagre response. The apparent disinclination of members to volunteer contributions to their meetings involved those responsible for carrying on the Association in a large amount of unnecessary trouble and anxiety, and necessitated special appeals being made to members who had already done duty, to step into the breach again. The Committee wished to impress, more especially upon the younger members, the desirability of their rising to the occasion, and, for their own good, as well as for the good of the Association, contributing of their experience and study for the general welfare, and taking a more active part in carrying on the Association, which now, embracing as it did the whole of Ireland, ought to prove of immense benefit to the profession, in a country where the members were, of necessity, so much isolated. The *agenda* for the meeting embraced subjects which were of interest to all, and might be expected to lead to most profitable discussions. They were also to be favoured with a lecture by their old friend Professor Ivison Macadam, on "Coals: Their Composition, Properties, and Uses," which, of itself, should form an attraction to all gas managers. They had to regret the loss by death during the past year of another of their extraordinary members—Mr. James Slight, of Glasgow.

The abstract of accounts and the Auditors' report were presented, and showed a balance in hand of £44. The membership of the Association stood as follows: Ordinary, 67; extra-ordinary, 26; and honorary, 2—total, 95.

Mr. G. Lennon (Dungannon) moved, and Mr. F. Eustace (Tullamore) seconded, the adoption of the report; and it was agreed to.

New Members.

The candidates for admission to the Association were—

Ordinary Members.—Acland, S. J., Ballymena; Allan, Nicol, Larne; Donaldson, W. M., Queenstown; Roberts, W. H., Newtownards; Syme, D. W., Naas; Young, W. E., Bagnalstown.

Extra-Ordinary Members.—Adamson, J. C., Airdrie; Mackenzie, D. C., Glasgow.

These gentlemen were unanimously admitted, on the motion of Mr. J. G. Tooms (Waterford), seconded by Mr. J. Richmond (Kilkenny).

Election of Office-Bearers.

The Hon. Secretary submitted the following names, as suggested by the Committee, for election as office-bearers:—

President.—Mr. S. B. Langlands, Coleraine.

Vice-President.—Mr. J. G. Tooms, Waterford.

Members of Committee.—Messrs. G. Airth, Dundalk; J. Lyne, Wexford; and G. Lennon, Dungannon.

Mr. C. B. Tully (Sligo) moved that these gentlemen be elected as suggested.

Mr. J. O'Grady (Dublin) seconded the motion, and it was agreed to.

Mr. Langlands thanked the members on his election. He said he felt it to be a very high honour indeed to be President of the Association. There was a good record before him, and he hoped to sustain it.

On the motion of Mr. Tully, seconded by Mr. W. Walker (Hillsborough), Mr. Whimster was re-elected as Hon. Secretary, and Mr. G. W. Norman, of Dublin, as Auditor.

Next Place of Meeting.

Mr. Langlands said he should be very pleased if the Association would hold their meeting next year in Coleraine. They had beauties of Nature there to show to the members; and he knew the Chairman of his Gas Committee would gladly welcome the members to the town.

Mr. Richmond said he had no objection to their meeting in Coleraine; but he would prefer, if they could arrange it, to hold it in the South of Ireland. They had never yet been in the south, and the name of the Association had been changed so as to embrace that part of Ireland.

Mr. Norman remarked that most probably the meeting the year after next would be at Waterford.

Mr. G. Cummings (Ballymoney) moved that the meeting be held in Coleraine.

Mr. Lennon said he had great pleasure, as a South of Ireland man, in seconding the motion.

Professor Macadam (Edinburgh) supported the proposition. He said he could guarantee that the Association would get a warm welcome at Coleraine. He spoke from experience of the hospitality they received there on the occasion of their last visit. He was glad to think there was a probability of their meeting in the South of Ireland, as it should be kept in view, now that the Association was the "Irish Association," that there should be a fair interchange between the North and the South.

It was agreed to meet in Coleraine next year.

President's Address.

The President then delivered the following

INAUGURAL ADDRESS.

I beg to tender my sincere thanks for the honour—the very great honour—you have conferred upon me by electing me your President; and I wish to give you all a cordial welcome to this, I may say, unique meeting. It is unique in that it is the first

meeting of its kind in Ireland in this new century, and it is also the first meeting under our new and more comprehensive title, "The Irish Association of Gas Managers."

Under these circumstances, I think it would not be amiss to look back over the past hundred years and see what great and wonderful achievements have been accomplished in connection with our industry. Although the existence of inflammable gases in coal was undoubtedly known earlier, yet no practical application of the knowledge was made until William Murdoch, a Scots engineer, while Manager of Messrs. Boulton and Watt's works in Redruth, Cornwall, devised the means for lighting up his own house with coal gas in 1792. A few years later he lighted up the Soho Foundry, where he gave the first public display of the new illuminant on the occasion of the celebration of the Peace of Amiens. It may be said that from that time forward gas had come to stay.

About the years 1804-5, the subject of gas lighting was taken up by many eminent chemists. Samuel Clegg, another engineer, and one of Murdoch's assistants, went heart and soul into the business; and with such clever men taking the matter in hand, it was no wonder that the young gas industry was bound to advance. As might well be supposed, the new light had its antagonists, as several branches of industry were doomed to suffer, and great doubt existed as to its safety—people imagining a whole town could be destroyed by the bursting of a main pipe in the street.

In the year 1812, the Gaslight and Coke Company was established, with a large capital. In the following year, Westminster Bridge was first lighted with gas, and the industry grew apace; for we find that in London alone in 1823 no fewer than four Gas Companies were in the field. In the Provinces, gas companies sprung up rapidly, and by 1830 there were 200 companies established for gas lighting in various towns in the United Kingdom. Gas lighting went on extending at such a rapid rate, that in the year 1860 almost every town could boast of its gas supply.

The first gas-works in Ireland were erected in Dublin in 1823, and was called the Dublin Gas Company. These works were on a small scale. Subsequently the City of Dublin Gaslight Company, the Dublin Oil-Gas Light Company, and the Hibernian Gaslight Company were started. The City of Dublin Gaslight Company and the Dublin Oil-Gas Light Company were in abeyance for several years, and the powers under their respective Acts had ceased to exist. Later on we had the United General Gaslight Company, who purchased the then existing works of the Hibernian and the Dublin Gas Companies. The United General Gas Company supplied at one time Dublin, including some of the townships, and Kingstown, co. Dublin. They also had works in Cork, Limerick, Plymouth, and Devonport.

So well had the pioneers in the gas industry done their work, that for many years no radical change was effected in the plant used for gas manufacture. And it would almost seem that so satisfied were gas engineers with everything that their predecessors had done, that they simply were content to make gas, enlarge their works, and extend their distributing system as the demand arose, without concerning themselves very much as to cheapening the cost of production or developing the effective value of their product. But in course of time a rival came to their aid, and proved an incentive in this direction which has been productive of wonderful results. Electricity—although discovered before gas, but allowed to lie dormant—began to waken up and come to the front as a very formidable opponent, proclaiming itself as the "light of the future." It was only natural that gas engineers should feel uneasy, and begin to look round them for ways and means of holding their own.

It is a recognized fact with gas managers that it is in the retort-house that the dividends are made, and naturally it was here that the first improvements took place. The old style of direct firing, which was expensive as well as having the merit of giving bad heats, was superseded by gaseous firing. Regenerative furnaces, one style after another, followed rapidly, until to-day the regenerative furnace is almost perfect, and is in use in most large gas-works. Inclined retorts also are in not a few works taking the place of the horizontal retorts, and no doubt they will come into more general use. It is, of course, of the utmost importance that, if an article is to be sold cheap, every economy must be used in its manufacture. Inclined retorts and conveyor plant are productive of great economy in labour. The coal arrives at the works either by boat or railway waggon; and by means of conveyors it is delivered to hoppers, ready for charging into the retorts. By a very ingenious arrangement, the proper quantity of coal is allowed to enter each retort. When the coal is carbonized, the lower mouthpiece is opened, and the coke drops out by gravitation, and is conveyed by machinery away to the coke stack. During all this operation coal or coke is never touched by hand. All this has been a great means of lowering the cost of manufacture.

Great improvements have taken place in the mode of purifying and washing the gas; and, from a chemical point of view, the gas consumed in our houses is as pure as gas can be. Lime was from the very beginning largely used in the purification of gas—first in a wet state, and eventually in a dry state; but now oxide of iron is extensively used, and, in some works, to the exclusion of lime altogether. This oxide of iron, or, as it is commonly called, bog ore, is to be found in great abundance in some of our bogs in Ireland; but for the want of a little energy, this splendid source of profit is allowed to go to waste, though we find our technical journals bristling with advertisements pushing the sale of foreign bog ores. This, to my mind, is not as it should be; and I trust the day is not far distant when we in Ireland, at any rate, will use nothing else but Irish bog ore and Irish lime, which is also abundant, for eliminating the impurities from the gas we manufacture.

Having given a brief account of the rise and development of the gas industry down to the present day, let us see what has been going on in regard to the proper utilization of this commodity. To compete with other illuminants, the consumer had to be provided with the best means of obtaining the best light at the least cost; and to this end the market was well stocked with several improved lamps and burners. But it was not till that world-famed man, Baron Auer von Welsbach, invented the incandescent burner and mantle that the gas industry could cry "Eureka," and hold its own with the electric light. I am glad to see that his native country has not been slow to give honour to whom honour is due. When the incandescent mantle first came out, it was claimed that for every foot of gas consumed one had a light of 15 candles. But with the march of progress, and the adoption of the intensified system, 35 candles per cubic foot of gas consumed are now available; and I venture to say that finality has not been reached yet.

Perhaps one of the greatest revolutions of modern times has been the introduction of the slot meter. Gas companies can now lay on gas for any person, feeling confident that they are not running the risk of having a bad debt, the gas being paid for in advance. Slot meters have certainly been the means of largely increasing the consumption of gas in those districts in which they have been freely used. Gas-cookers, no doubt, have been a boon to both gas companies and householders alike. Gas-fires, too, have played an important part in the gas world; and where they have been adopted judiciously, they have given general satisfaction. With their aid, one can have a pleasant fire in drawing-room or bedroom in a few minutes, without the trouble attendant on the use of the ordinary coal-fire. The cleanliness is an important factor when one considers the wear and tear of furniture; and the absence of smoky chimneys, giving a pure and healthy atmosphere, is not their least recommendation.

No notice of the progress of the gas industry during the past century would be complete without taking into consideration the vast possibilities opened up by the development of the gas-engine. Not alone is it superseding the steam-engine of larger power, with its smoky chimney and attendant pollution of the atmosphere, but its advent has made possible the use of power in small factories and workshops where steam would have been impossible. The gas-engine is certainly proving itself the cheapest means of sending round the shaft and pulley. It requires no further attention than to keep it oiled and to maintain its supply of gas; its simple and ingenious machinery will do the rest.

Having said so much on the uses of gas, and the benefits to be derived therefrom, I will now make a few suggestions for the gas manager. The Irish manager, if he wishes to be successful, must be thoroughly well up in all branches of the profession. He has to rely solely on himself. He is not like his brother across the channel. Our concerns are mostly so small that they cannot afford a foreman over each department; therefore the manager has always to be on the alert, and to give his constant attention. The gas manager should be like a commercial traveller, always on the look-out for a new customer; and he should study the best means at his command to increase his consumption.

I think gas companies should, in every town, supply gas fittings, cookers, fires, &c., at cost price. By this means new customers would be gained and existing ones would increase their consumption, as there is no doubt the gas-fitter's account has a good deal to do with things being allowed to remain as they are.

A town need not be badly lighted nowadays, as there is no excuse for the old style of burner, which, as a rule, made darkness more dark. With improved lanterns and incandescent burners, the streets of our country towns may be made bright and pleasant to travel through (no matter how dark the night), and that without any additional expenditure, as the saving in gas consumed will in a short time pay for the burner.

Just a word about the manufacturing plant. I am sorry to say that the great majority of gas-works in the country towns of Ireland are still working on the same plan, and with the same plant, as they started with, perhaps forty years ago. Now, this is not as it should be; it is not reasonable for directors or corporations to expect their managers to give the same, or nearly as good, results working under such conditions as the company on the other side that has been keeping abreast of the times.

To begin with, the Irish gas manager, except in a very few cases, is still working with antiquated retorts, small furnaces for the purpose of heating, and smaller ovens for enclosing the retorts. Condensing plant in nearly every gas-works which I have visited in this country is very much on the small side, with the inevitable result that a great many unnecessary troubles have to be encountered. Washing and scrubbing machinery were too great a luxury, and, of course, were left out of the designer's plans, for the purpose of saving a few pounds at the outset, which would have been as nothing compared with the trouble and money that might have been saved if those very essential articles had been provided, not to speak of the satisfaction to the consumer. Again, if you mention such a thing as an exhauster to some directors or gas committees, they will usually ask "What sort of a thing is that?" Gas managers, of course, know what an exhauster is, yet very few gas-works in Ireland—I refer to the smaller-sized works—have one, which is another illustration of the penny wise

and pound foolish policy. The retorts have themselves to take the part of an exhauster, and bear all the back-pressure from the holders, thereby causing enormous wear and tear, and a large falling-off in the production of gas per ton of coal carbonized.

Gas managers should, as far as possible, instruct their directors in the manufacture of gas; and I feel confident that when directors understand for themselves the benefits to be derived from certain suggested improvements, they will fall in with the manager's ideas, and, as funds permit, have the necessary alterations carried out.

One more suggestion and I have done. We ought always to try and get the best coal that can be procured. In Ireland, unfortunately, we cannot get coal for gas purposes, and have to send to England or Scotland for it. By procuring the best gas coal, we can do with less of it; and when we have a heavy sea and railway freight to pay, this is a great consideration. I would have had something to say about water gas; but as my friend, Mr. Tully, of Sligo, is giving us a paper on the subject, I will not take up any more of your time.

Mr. EUSTACE said that they must thank the President very much for the information he had given them. He had paid very close attention to the address, and in it there were a good many remarks which would benefit managers of small works, such as himself. There was certainly room for much improvement in a number of works of this class, where they were operating with plant which was quite inadequate. It was hardly fair of directors to expect managers to produce a good return if the plant was very old. He was of opinion that small managers should get their directors to adopt improvements in plant, which would put them in the position of being able to compete with other managers.

Mr. H. KIRKHAM (New Ross) said he had great pleasure in seconding the proposal. He was sorry he could not agree with the remark about the directors. He thought that if managers were to educate their directors, it might be a case in which a little knowledge was dangerous.

The PRESIDENT said he felt very much flattered by the members' appreciation of his feeble efforts; and he might say that he had not had the experience of his friend who had just spoken. He always found that the more he instructed his directors, the more harmoniously they worked together.

Mr. J. G. TOOMS (Waterford) read the following paper:—

SOME DIFFICULTIES WITH A GASHOLDER.

About this time last year, I was in dire trouble owing to the vagaries and the utter unreliability of the largest holder (No. 3) at the Waterford Gas-Works, where I had just taken up the managership; and this paper consists of the experience I have had in connection with the holder for the past twelve months.

The holder is a three-lift one, erected 25 years ago, diameter 80 feet, depth of tank 12 feet, with the usual cast-iron columns, twelve in number, and guide framing. When full, the holder contains 133,000 cubic feet.

Owing to the very soft subsoil—peat—the tank of the holder, which is a concrete one, had gradually sunk, mostly on the side where the peat is deepest, until the tank was 14 inches out of plumb. It was then necessary to level up the tank walls, put distance pieces of proper height under the base of the columns—thus having all the columns on one level—and put new concrete resting blocks in the tank for the shells of the holder to rest level on when down. This was done during the summer of 1899; and I understand that when the holder was first used after these alterations, it worked satisfactorily. But in a few weeks' time trouble commenced; the holder jambing and not cupping properly. This was owing to the fact that the timber blocks used for packing up the shells of the holder while the permanent resting blocks were being put in, were not removed; and after the holder had been working for some little time, some of the blocks found their way between the shells of the holder, thus causing the holder to jamb, and by getting under the lute plates prevented it from cupping properly.

During the following winter, further trouble was experienced in working the holder. A number of timber blocks were taken up from between the shells by means of various contrivances; but not without doing considerable damage to the holder, and a good deal of gas was also lost.

From the number of blocks taken out, and there being no trouble during a spell of several weeks, during which time the holder was carefully watched, and pressure thrown by it recorded, it was thought there could be no more blocks in. Consequently, the tank was not emptied during the summer of 1900. The columns having been plumbed, it was thought there would be no further trouble with the holder; this being done just previous to my advent in Waterford.

Such was not the case, however. I had been in charge a fortnight when the holder unsealed at the cup, and we lost 36,000 cubic feet of gas. This happening at midnight or thereabouts, no one was aware of the fact until the foreman stoker went to take stock at 1 a.m. In consequence, a steam-pump was connected up, and the cups filled with water every hour; and the holder was carefully examined every quarter-of-an-hour. It was decided to counterbalance the holder at three equi-distant points, connected by three steel wire ropes to one counterbalance weight; the object being that before any one point could descend out of level, it must take the whole weight of the counterbalance off the other two points. It was also decided to guide the holder by means of outside rubber-tyred rollers bracketed on to the grips of the second and third lifts and on to the tank walls.

Before we had time to make any progress with this work, we had another mishap—the holder, when almost full, unsealing at the cups, and 60,000 cubic feet of gas was lost. This happened at 4 o'clock in the afternoon. I was on the spot myself, and a few minutes before had taken the levels, when the holder was not more than 2 inches out. We were at a loss to account for the mishap at the time; but subsequently two pieces of timber, 32 in. by 9 in. by 4 in. and 30 in. by 7 in. by 3 in. respectively, were found under the lute plate of the second lift. They were badly scored, and had the appearance of having had a rough time.

After this, all haste was made to get our proposed counterbalancing and guiding arrangements fixed and working; and in a very short time we had everything in going order, when there was immediately a noticeable improvement in the steadiness and general working of the holder. I think the efficiency of the treatment may be reckoned by the fact that, though during last winter 18 pieces of timber were taken from under the lute plates, we did not have a single mishap, neither did we lose any gas.

During the present summer the tank was emptied, and 13 pieces of timber and a ladder taken out. So I think we can say good-bye to our troubles in this direction. It is a question whether the faulty working of the holder was primarily due to the timber left in the tank; but at the time it was decided to counterbalance and guide it outside, it was supposed there was no timber remaining in the tank.

I am unable to state whether the satisfactory working of the holder for the past eleven months is due to one or other of the two systems—guiding or counterbalancing—as they were both completed at the same time, and have both been working in conjunction ever since. My own impression is that the guide-rollers are mostly responsible for the improvement. Although there is no more timber to contend with, I would not care to work No. 3 holder without the rollers. As the work in this case was all carried out by our own workmen, the expense was not great. Our total storage is 215,000 cubic feet; our maximum 24 hours' output last year was 345,000 cubic feet. So I think you will agree our position this time last year was an unenviable one.

Discussion.

The PRESIDENT said that certainly Mr. Tooms' difficulties with his gasholder had been great.

Mr. S. B. LANGLANDS (Coleraine) thought Mr. Tooms had not had his troubles to seek. It seemed a most peculiar state of affairs—logs of timber floating about in the cups and in the holder, and the holder breaking out in all sorts of places. The only similar experience he had was in a place where he was called in for consultation. He found there were no guide-rollers at the bottom, and when the holder jammed they had to prise it off the wall. He suggested that guide-rollers should be put, not on the holder itself, but on the edge of the tank. It was found that this worked very satisfactorily. He remembered another case in which a holder uncupped. He was Assistant-Manager at the time. A man came running to him saying that the holder was coming down with a rush. He ordered him to get the water on to the lute at once. They emptied the holder into another, and pumped the tank; and they found that, instead of an ordinary rivet having been used in the circle of the cup, a leather one had been employed, which had been washed out. They lost about 15,000 cubic feet of gas. He could realize that it could not have been a pleasant time for Mr. Tooms last winter.

Mr. J. RICHMOND (Kilkenny) said that the experience Mr. Tooms had had with his gasholder was certainly unique. He (Mr. Richmond) could verify his statements, for he saw various portions of the timber which were removed; and if Mr. Tooms would explain his method of taking them out, it would be interesting. It was something extraordinary. He saw pieces of timber 6 inches thick and 4 feet long.

Mr. J. LYNE (Wexford) said he remembered when the holder about which Mr. Tooms had spoken was erected. He had the honour of being called in by the Directors of the Waterford Gas Company, about 1892, to inspect the works and make a report upon them. As well as he could remember, there had then been no difficulty in the working of the holder. It seemed to be rising and falling vertically. It appeared that the tank of the holder had been erected on very treacherous ground; but it amazed him that it should, after about thirteen years, have sunk as it had done. Perhaps pumping, or something of the kind, had taken place, which affected the foundations. In his opinion, the levelling was not at all the cause of the trouble Mr. Tooms had had, but leaving in the blocks of wood was. There seemed to have been great carelessness in allowing the timber to remain. It was not to be wondered at that Mr. Tooms had trouble with it. He (Mr. Lyne) did not know what was meant by rubber-tyre rollers, and he should like this explained more fully.

Mr. G. CUMMINGS (Ballymoney) said he knew of a gasholder which had to be pumped; and instead of rollers being attached to the curb, they were fastened to the bottom of the holder; and it worked quite well. He was acquainted with the holder of which Mr. Langlands had spoken, and had seen it several times since the rollers were put on. He had known of a straight bar from the bottom of the tank to the top of the pillar, and an eye on the top of the tank, fastened to the wall, and another on the top of the pillar. In one case he had to get into the holder to

examine it, when he found that the tie-rods from the centre of the uprights were entirely gone. When they were renewed, they kept the holder so close to the rods that they gave way at the bottom. But the eyes at the bottom kept it on to the upright rods, and brought the whole thing right up. These were troubles which had occurred after the holder had been working a great many years; and so he did not wonder at this happening, in Mr. Tooms' case, after the holder had been examined and passed.

Mr. LANGLANDS explained that in the case in which he was called in there was only one holder on the works, and therefore they could not empty it and put on a curb. He put on wooden rollers.

Mr. T. FRIZELLE (Holywood) asked if it was not possible that someone might have maliciously placed the timber where it was —say when the holder was up.

Mr. H. KIRKHAM (New Ross) said he knew something about this wonderful holder, as he was at one time assistant at Waterford. The trouble began about the year 1896. It was a three-lift holder, and it was when the bottom lift was up two sheets that it began to cause trouble. It was thought advisable to make some alterations in the holder, so as to keep the gas in it. The workmen then left the timber inside the tank. He had seen the holder going on in a mysterious manner, although, to all appearance, it was all right.

Mr. RICHMOND said Mr. Tooms was aware that there was timber in the holder, and he had no option but to adopt the precautions he did to get it out.

Mr. J. C. ADAMSON (Airdrie) thought the experience of Mr. Tooms was, so far as he knew, quite unique. He had never heard of anything of the kind before; but he could quite understand how the blocks were not removed—by some blockhead, he should say. They must, of necessity, when floating about in the inside of the holder, come into contact with the three rising lifts, and thus get jammed. He himself had been connected with the gas industry more or less for nearly half-a-century, and had come into contact with many managers who had had many experiences; but he had never heard of anything like that which had just been described.

Mr. KIRKHAM explained that the holder Mr. Tooms had written about was originally a single-lift, in a cast-iron tank; but they were short of storage, and they telescoped it, making it a three-lift holder. The tank had gradually gone out of level. To get the new holder to work plumb, they bolted five channel-irons around the tank, to serve as guides. It went very well for three months. It was finished in August; and in October the trouble began. It worked smoothly till the bottom lift landed, and then the pressure would suddenly drop in jumps of 1½ or 2 inches at a time; then it would as suddenly increase, varying from 15-10ths to 30-10ths. This would continue until the second lift had gone down 3 feet. At such times they had a small gasholder which they used as a sort of governor. He wrote to the makers, who asked him to take a series of tests—say every 3 inches the holder went down. This was impossible; and the makers sent men to regulate the matter. They raised the outer lift clear of the inner lifts; and when they got inside, they found it was scored heavily where the sides had been rubbing against the tank. The upright stays in the bottom of the lift—the five upright bars they had put in—had been rubbing hard on the guides of the cup of the inner lift. The makers' men relieved each of the upright stays ¼ inch, and the holder was now working smoothly.

Mr. ADAMSON asked if the place where the abrasion occurred was at the side where the tank had gone down.

Mr. KIRKHAM said it was not—it was in no place more than another.

Mr. ADAMSON explained that he put the question because at the side of the tank which dropped, the water would naturally flow; and when the lifts of the holder began to come down, they might get forced in that direction and be jammed.

Mr. LYNE remarked that he should be inclined to suggest that it was because there was timber inside the tank.

Mr. KIRKHAM said there was no timber in it at that time.

Mr. TOOMS said the moral of his paper was that they should not leave timber in tanks. Perhaps some managers would think that doing this might not cause serious trouble to them, but that the timber would float in the tank and never come in contact with the curbs of the second and third lifts. But this did not follow. In 1899, the holder was 14 inches out of level. At that time—the beginning of September—it was difficult to keep up the supply of gas if they were to empty the holder; and this was the reason the rubber rollers were put on. They were bracketed on to the tank wall. As regarded the way in which they got the timber out, the blocks had worked into the lute of the second and third lifts. They lowered the top lift till it was about midway, and then got a plank and prised the sheets of the top lift inwards. If the block was tight, they drilled a hole and punched the block in; then they lifted it where they had prised in the plates. He need not say that this was not done without causing considerable damage to the holder. As the blocks were left in before he went to Waterford, he had not endeavoured to say who was or who was not responsible for the timber being left in the holder.

Mr. C. B. TULLY (Sligo) read the following paper:—

THE ECONOMICAL PRODUCTION OF DILUTING GASES.

From the time when the dilution of coal gas with cheaper gases was first employed, the author has felt the grave importance of the subject. The objections to the use of straight water gas appeared to him far stronger than its advocates are willing to admit. While investigating the subject, he heard Professor Vivian B. Lewes's lecture on "Acetylene and its Modern Developments," delivered before the Gas Institute in 1898. As the members will recollect, Professor Lewes then stated that it is possible to make, in a slightly modified water-gas generator, a cheap diluting gas of the following composition to be used for diluting acetylene:—

	Per Cent.
Hydrogen	45
Carbon monoxide	15
Methane	30
Unsaturated hydrocarbons	5
Carbon dioxide and nitrogen	5
	100

All at once it occurred to the author that such a gas should form a satisfactory diluent for coal gas, especially having in view the subsequent enrichment of the mixture with benzol. Having investigated the subject on the lines stated, he communicated with Professor Lewes. As a result, that gentleman generously put all his experience at the author's disposal. He further furnished the drawings from which the trial plant at the Sligo Gas-Works was erected some eighteen months back.

Since that time experiments have been carried on almost continuously. It is, however, only within the last few weeks that sufficiently accurate data have been obtained to form a definite opinion upon the merits of the system. Much time was lost in procuring and arranging the apparatus necessary for making complete analyses of the gases; also in systematizing the laboratory tests, as well as the working of the generator itself. In both cases the operations have been reduced to the simplest routine, well within the capabilities of the average young assistant. The superiority of such a gas over water gas as a diluting gas is quite evident, and its most fascinating features are its similarity in composition to coal gas, its high calorific value, and the small percentage of carbon monoxide contained in it.

When first erected, the generator was fitted with fire bars; the blast and steam being introduced under the bars, and the oil sprayed in about 2 feet above them. Owing to the peculiar shape of the grate, difficulty was experienced with the bars; therefore the author decided to dispense with them, introducing the blast from four points in the circumference of the shell. This arrangement is found to work very well. The clinker solidifies about four inches above the blast, and forms a natural grate, open and easily removed. Clinkering should take place about every eight hours (the necessity for which is ascertained by the blast-pressure gauge), and is done by removing the clinker under that just formed, and afterwards breaking down the clinker forming the natural grate, leaving it in the base of the generator for removal at the next clinkering; the generator being cleared out completely every second or third day.

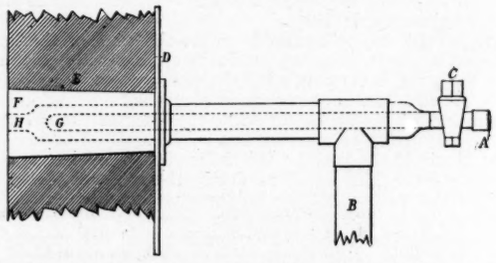


FIG. 1.—BLAST-OIL AND STEAM FITTING TO GENERATOR.

A. Hydrocarbon and steam supply. B. Blast supply. C. Stopcock. D. Generator shell. E. Generator wall. F. Cast-iron block. G. Steam and hydrocarbon. H. Blast, &c., to generator.

It occurred to the author that it would simplify matters to introduce through the blast nozzle the steam and also the hydrocarbon to be decomposed. Drawing No. 1 shows this arrangement, which is so simple as to require no explanation. Very great difficulty was experienced in spraying in the hydrocarbon satisfactorily; but this was eventually overcome by the adoption of the steam injector shown in Drawing No. 2. The mixing chamber is fitted internally with a strip of copper having a twist of half-a-turn to give the steam and hydrocarbon a rotary mixing action. Drawing No. 3 shows the general arrangement of the plant. The only difference between it and the ordinary carburetted water-gas plant is the form given to the generator by Professor Lewes and the author's method of introducing the blast, steam, and hydrocarbon to the generator. The fuel in the generator must be of sufficient depth or density to filter out or retain all the carbon produced on the decomposition of the hydrocarbon. The carbon passing the generator will be deposited either in the carburettor or in the superheater, and be there consumed during the blow—aiding in the heating of these parts of the plant.

The author worked the Lewes generator for some months, injecting gas oil for the production of a diluting gas. The proportions of steam and oil were varied from time to time, in order to arrive at the best results. Further, complete analyses of the gases were made at every trial. At the end of an extended series

of experiments, he was forced to the conclusion that the cost of gas oil was too great for the purpose. It was therefore decided that the success of the process must hang upon the possibility of using the tar produced in the works from both the ordinary coal-gas and the carburetted water-gas plants. He therefore determined to devote his time to settling the question as to whether or not these could be used commercially. It also appeared that a further condition of success is to produce a gas having a minimum of carbon monoxide.

His subsequent investigations were, therefore, conducted with a view to realizing these two objects; and it is believed that the results obtained so far show that a large measure of success has been reached on these lines. Following the course adopted when injecting gas oil, trials and analyses were made to determine the best proportions of steam and tar and the period of injection.

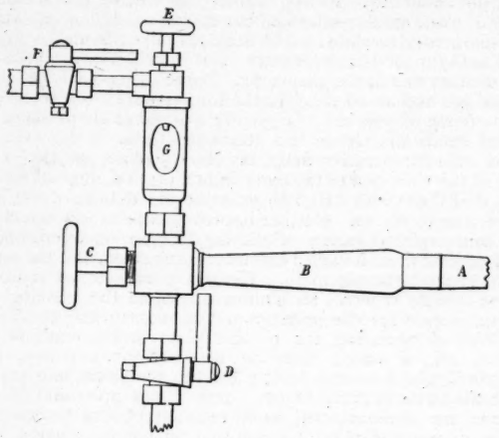


FIG. 2.—HYDROCARBON INJECTOR.

A. Supply to generator. B. Mixing chamber. C. Steam-regulating valve. D. Steam stopcock. E. Oil-regulating valve. F. Oil stopcock. G. Oil sight-feed.

It was found that the best results were obtained when running tar and steam for twelve minutes, steam alone for three minutes, and blowing for five minutes; and that with a consumption of about 30 lbs. of coal-gas tar per 1000 cubic feet of gas made, a diluting gas is obtained of the following average composition before purification:—

Carbon dioxide and sulphuretted hydrogen	5·00	per cent.
Hydrocarbons absorbable by bromine . .	2·40	Ethylene, propylene, butylene, &c.
,, ,, ,, nitric acid .	0·95	benzene vapours.
Carbon monoxide	15·03	
Methane	8·00	
Hydrogen	65·50	

So far as can be seen, the tar is completely decomposed into gas and carbon; there being no tar or condensable hydrocarbons whatever from the plant.

The striking points in the composition of this gas are: (1) The very large proportion of hydrogen and benzene vapours; (2) the small proportion of methane as compared with Professor Lewes's anticipations. It may be mentioned that when introducing the tar at the bottom of the generator, it was expected to be completely decomposed into carbon and hydrogen. But such was

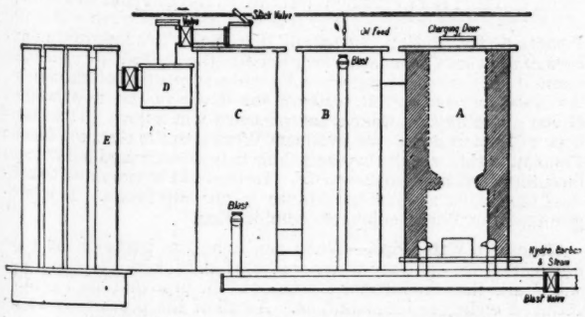


FIG. 3.—GENERAL ARRANGEMENT OF PLANT.

A. Generator. B. Carburettor. C. Superheater. D. Hydraulic Seal. E. Washer-condenser.

not the case; and it is quite evident that the tar or other liquid hydrocarbon is well able to look after itself without the assistance of the steam—the latter only being necessary for the purpose of injecting the tar, and the less steam used the less carbon monoxide produced.

At least a hundred analyses have been made of the gases, also of mixtures of these gases with coal gas, and some very unexpected discoveries have been made of the performance of the gases within the generator. These, however, must form the subject of a later communication. The reactions are many and complicated—so much so that the author hopes to persuade Professor Lewes to deal with the subject. The two sets of experiments with gas oil and tar respectively showed that the sole advantage to be obtained by the use of the former in the proportion of 3 gallons per 1000 cubic feet of gas made, is an increase of 1·2 per cent. of hydrocarbon absorbable by nitric acid, and a slight increase in hydrogen above that given by the same proportion of coal tar. Curiously, whether oil or tar was used, and whether 1, 2, or 3 gallons per 1000 cubic feet were employed, it was found that the percentage of methane present in the resulting gas was practically the same.

It has been found that the producing capacity of the plant, whether making water gas or the author's diluting gas, is practically the same. The cost of the two processes is also nearly the same; being for 1000 cubic feet of gas made the difference between the cost of 30 lbs. of tar and that of 30 lbs. of coke.

The experiments and analyses furnishing data for this paper were only completed and checked within the last few days. The service between the diluting gasholder and the photometer and calorimeter has only just been completed; hence no tests as to the lighting and heating values of the gas have yet been made directly. Judging, however, from the analyses, the appearance of the flame, and the performance of the diluting gas when mixed with coal gas, the photometric value may be fairly estimated at 8 candles, and the calorific value at about 100 to 120 calories.

Many points of interest have been noted in connection with the use of this diluting gas. To describe these fully, together with the methods of mixing it with coal gas, would far exceed the time allowed for the reading of papers before you. If the subject is of interest to the members, the author will gladly furnish a paper upon it at a later date. It may, however, be mentioned that at Sligo the diluting gas is mixed with the coal gas at the hydraulic main, and afterwards carburetted at the governor with benzol to the necessary illuminating power, before being delivered to the town mains. The results obtained by mixing at the hydraulic main, though eminently satisfactory, throw great doubt upon the predictions of many engineers as to the amount of benzene vapours to be recovered from the tar by this method of mixing.

The diluting gas as made by this process contains, as already shown, a considerable proportion of hydrocarbons. The presence of these hydrocarbons allows of the gas under consideration being carburetted to the same degree as water gas with a much smaller proportion of carburetting oil. Another strong point in favour of this process is the employment of the tar produced in the works by the carburetted water-gas and coal-gas plants in the generator. The proportion of carbon monoxide present in this gas is very low as compared with that in water gas; consequently the quantity of the author's diluting gas that can be mixed with coal gas is at least twice as great as that which can be used with water gas. Even then the proportion of carbon monoxide in the former mixture will be lower than that with water gas.

Existing water-gas plants can be modified at a nominal cost to suit this process. Further, there is no smell from the generator when injecting tar. The labour required for working the generator is somewhat less than in the case of water gas. It is not within the scope of this paper to enter into commercial results. From the facts already given, it will be seen, however, that the Sligo Gas Company will have no reason to regret their enterprise in erecting this experimental plant.

In conclusion, the author begs to thank the members for the attention they have given to his paper, and sincerely hopes that his efforts in this direction may induce other engineers to take up the subject. Although much has been accomplished, he feels that the system can be still greatly developed in large works having capital and far greater facilities for experimental work at their command than are possessed by his Company.

Discussion.

The PRESIDENT remarked that Mr. Tully's paper had opened up a large field for discussion.

Mr. J. LYNE (Wexford) said the paper would have been of more interest to the members as gas makers—to himself, at all events—if the author had told them something about the pounds, shillings, and pence of the subject. He (Mr. Lyne) did not see where this element came into the paper. There were many sources from which they could obtain gas, but would it pay to use them? That was the question; they had no statistics before them. They had heard, at the last meeting of the Gas Institute, some very good papers on this matter, and also a very full discussion—with the result, to his mind, that, except in certain very rare cases, when there was want of space on the works for making extensions (such as at Belfast), and where there were greater facilities for getting oil at a low price, they never thought of water gas as an auxiliary. And even in places which had such great facilities for getting oil, there did not appear to be an advantage in price over coal gas. In the discussion to which he had alluded, there was a very able paper by Mr. Porter, of Elland, which, though it was severely criticized by some, was supported by Mr. Shadbolt, of Grantham, who was an engineer of eminence. Mr. Porter brought out, from parliamentary returns, that the cost of water gas was about 21·6d. per 1000 cubic feet, which was more than the cost of coal gas. Mr. Isaac Carr, of Widnes, said he was able to put his coal gas into the holder at about 5d. per 1000 cubic feet. It appeared that where water-gas plant was used on a large scale, it was standing idle for a great part of the year. He knew that some people who resorted to water gas when coal went up in price, had found that they had burnt their fingers with

it. In another paper, the cost of water gas was given at 16·29d. per 1000 cubic feet, which was much less than Mr. Porter had stated; but they would see that it was also much more than the figure for which Mr. Carr was able to make coal gas.

Professor MACADAM (Edinburgh) said he scarcely took it that Mr. Tully was responsible for Professor Lewes's analysis. It was not his, and he did not claim it. He should say that it was quite frankly shown that the two last vapours—carbon dioxide and nitrogen—were residues which were not accurately defined. But he thought they were already getting outside the lines Mr. Tully intended. He (Professor Macadam) took the paper to be an introductory one, of a most interesting character, and read before them more with the object of bringing under their notice a new system, and of, very legitimately, drawing their attention to the fact that Mr. Tully had started an investigation, of which he said he intended giving them the complete results on some future occasion. If, therefore, they were to go into the cost of the process at the initial stage, the only figures that Mr. Tully could give them were those obtained from a trial on a very small scale, which were absolutely of no value unless they were compared on a similarly small scale with other plants and other processes. He (Professor Macadam) thought their duty was to really thank Mr. Tully for his very interesting communication, looking upon it as an initial one which might lead up to a much more important set of results, probably by Mr. Tully, but it might be by other members of the Association. He thought this was the position they were in at the present moment.

Mr. J. G. TOOMS (Waterford) said he had listened attentively to Mr. Tully's paper, and must confess that he did not understand it very well—in fact, he could tell them nothing about it. But he would like to make the remark that when they got home and read it at their leisure, they would find it very interesting. And then, as opportunity occurred, they would be able to start where Mr. Tully had left off, which would be a great advantage.

Mr. S. B. LANGLANDS (Coleraine) said he also had to thank Mr. Tully for his paper. He did not rise to discuss it, because it was not a complete whole. They would wait till the next meeting, in the hope that Mr. Tully would then come forward with further results. There was a small matter which he might mention. Was there any arrangement at the place where the tar impinged, to prevent clinker being formed?

Mr. J. A. CARTER (Castlebar) asked what was the composition of the tar.

The PRESIDENT said he was struck with the extreme simplicity of the generator, which he had seen working at Sligo. Benzene vapours were a very high percentage, and he should like to ask Mr. Tully if he could give some idea of how it was obtained.

Mr. LYNE said, notwithstanding the remarks of their respected friend Professor Macadam, he thought it would have been better if they had had some information regarding the commercial results of the process, because, after all, they were commercial men, and were interested in pounds, shillings, and pence as much as in any scientific process—perhaps even more so.

The PRESIDENT thought it was not so much the cost of the process they should look to, as the great advantage it would be to them if they found themselves suddenly short of a supply of gas in winter. He had the advantage of seeing Mr. Tully's apparatus at work at Sligo, and it was simplicity itself. They merely had the generator put on, the flues connected, the coke brought to a sufficient heat, and the steam turned on, and then they saw the holders gradually going up. Then, if they wanted to enrich, they turned off the steam and put on the oil, and they had the enrichment at once.

Mr. LYNE: We get that at present from any water-gas system.

Mr. TULLY, in replying upon the discussion, said he thought perhaps the first thing which he had to do was to apologize to the members for not putting the paper into their hands before the meeting. But he might point out that he had had eighteen months' labour at the thing, and he only wrote the paper on the previous night; and the writing of it was more trouble to him than the eighteen months' labour. With reference to pounds, shillings, and pence, he thought that when Mr. Lyne had the printed paper he would find that he (Mr. Tully) did mention sufficient to enable them to calculate the difference between his gas and water gas—the difference between 30 lbs. of tar and 30 lbs. of coke per 1000 cubic feet of gas made. If they read the paper and studied the matter for themselves, they would be able to gain a great deal of information he did not think necessary to mention. He had made an analysis of the tar. It was produced from Scotch coal, of course carbonized at a high temperature, and the composition of the tar was 6·05 per cent. of hydrogen and 78 per cent. of carbon. The President had asked as to the percentage of benzene vapours. The hydrocarbons dissolved in nitric acid were not necessarily all benzene, but they were in the series of benzene, which they had been told was formed in the generator, in red-hot tubes, by the splitting up of fatty compounds; and he took it that the tar and fatty compounds were split up into methane. In 30 lbs. of tar they expected to find ¼ lb. of benzol; but by splitting it up in the generator they got about 2 lbs.

A vote of thanks was accorded to Mr. Tully for his paper.

The remainder of the proceedings will be reported next week—a paper by Mr. S. B. Langlands, of Coleraine, entitled "The Relation of Consumers to the Gas Manager," and a lecture by Professor W. Ivison Macadam, of Edinburgh, on "Coals: Their Composition, Properties, and Uses."

Mr. A. MACKENZIE (Edinburgh) moved a vote of thanks to the President for his conduct in the chair.

The motion was carried unanimously, and the proceedings terminated.

The company hurriedly repaired to the Great Northern Railway Company's station in Amiens Street, where they took train for Sutton, and there transferred to one of the Railway Company's electric tramcars, upon which they made the circuit of the Hill of Howth. At the terminus in the village of Howth they alighted, and dined together in the St. Lawrence Hotel.

On Wednesday, a large party visited, by permission, the engineering shops and the gas-works at Inchicore, belonging to the Great Southern and Western Railway Company. They were received by Mr. Outon, and were shown over the place by him and his assistants. In the railway engineering shops there was seen at work much modern labour-saving machinery, as well as a furnace heated to white heat by Siemens gas made on the premises, and used for the larger forgings. But the chief interest shown by the visitors was in the gas-works. There are two sides to these—a coal gas and an oil gas. In the former works, the retort-bench is in course of renewal. Originally a bench of six ovens of fours, direct fired, Mr. Outon has converted three of the ovens into sixes, with regenerative firing on Mr. Chester's system. On the day of the visit, one of the ovens was at such a stage of construction that those who cared to examine the details of the setting were able to do so. Further improvements in the retort-house are contemplated, such as abolishing the tapering ascension-pipes, and making them 6 inches diameter throughout, and the enlargement of the hydraulic main. The gas manufactured is from 17½ to 18 candle power. Mr. Outon described the working of the arrangements for the primary and secondary air, and also his method of operating the purifier plant, which consists of six boxes, all of which were in use. There are two, placed diagonally, of lime and oxide; and the remaining two are filled with the latter material alone. The oil-gas process is Pintsch's. There are three stacks, each containing four retorts, which work in vertical pairs. These are sufficient to make gas for illuminating the passenger carriages running upon 1100 miles of line. The oil used is crude shale oil of ·850 sp. gr., made in Scotland. The gas is purified in small boxes containing lime and sawdust; and it is then stored in a holder, from which it is drawn, either to the carriages direct, or is compressed into portable tanks to a pressure of 150 lbs. per square inch. These tanks are sent off to junctions for the supply of trains on branch lines. In the compression of the oil gas there is produced a residual of a tarry nature—rich in benzol—which Mr. Outon employs for the enriching of the oil gas, which he passes through sponge cloths saturated with the hydrocarbon. By this means he raises the illuminating power of the coal gas by about 1½ candles. The oil gas produced is of from 42 to 48 candle power. At the conclusion of the visit, the Hon. Secretary proposed three hearty cheers to Mr. Outon for the trouble he had taken in arranging the visit and attending to the visitors. The party then travelled by train to the Kingsbridge terminus of the railway, where they dispersed; thus bringing the gathering, which had been an exceedingly pleasant one throughout, to a close.

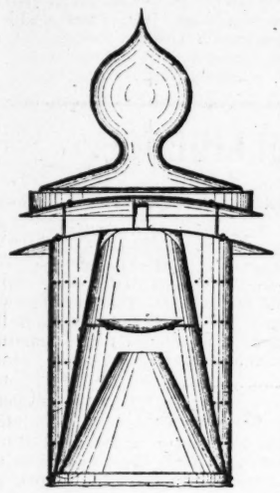
Institution of Gas Engineers.—In view of the Engineering Congress in Glasgow the first week in September, it has been arranged to hold the autumn meeting of the Institution in Edinburgh on Monday, Sept. 2—the day preceding the commencement of the sittings. The programme includes a visit to the gas-works in course of construction at Granton; and the members will no doubt find that their President (Mr. W. R. Herring) has there much of interest to show them. For this visit a special train will leave Princes Street Station at 10 a.m. The Lord Provost and members of the Gas Commission will honour the visitors by receiving them at the gas-works station. After the inspection of the works, luncheon will be served beneath the dome of the new holder. Given a fine day, another great pleasure will follow. The members will proceed, *viâ* the Products Works, to the Granton House Policies, within which they and their lady friends and others will be entertained at a garden party. Brakes will be provided to conduct the ladies to Granton House in the afternoon. The programme provides an enjoyable combination.

Cleaning a Water-Pipe.—When replacing the parts of the pipe connecting the military water-works of Sétif with the citadel, it was found that the interior diameter of the pipe had been greatly reduced owing to incrustations. As all of the pipes were to be employed again, attempts were made to clean them by immersing them in a solution of hydrochloric acid. After various trials, no satisfactory results were obtained, owing probably to the schistose nature of the deposit. The following process was then adopted: Two lengths of pipe were laid side by side on the ground, about 6 feet apart. Above them, fifteen other pipes were placed, then across these fifteen more, and so on until there were seven or eight rows of pipes one above the other. The spaces between the pipes were filled with pieces of wood, which were set on fire. When the pipes were cool, all the incrustation was easily scraped out with bent rods. In 137 pipes 9 feet long, treated in this way, only six had to be rejected on account of cracks. According to the "Revue du Génie Militaire," which contained these particulars, the cost was somewhere about 5d. per yard.

REGISTER OF PATENTS.

Street-Lamps.—Moore, J., of Whitley. No. 6019; March 31, 1900.

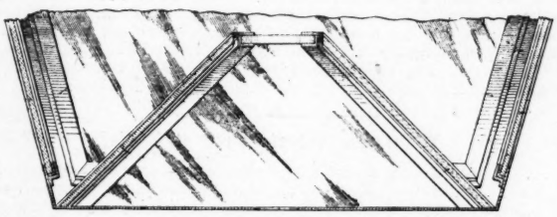
This invention in incandescent gas-lamps has for its main object the prolonging of the life of the mantles, by preventing the entry of draughts within the lantern; also to avoid shadows at the bottom of the lamp.



The improvements are directed more particularly to the outlet or chimney, the door, the panes, and the bottom of the lantern.

The chimney is disposed as usual; but at or about its top is an outlet communicating with the interior, and projecting beyond it for a suitable distance. The outlet takes, by preference—in section, at right angles to the vertical centre of the lamp—the form of a curve with a large radius. Within the chimney is a cone or other appropriately shaped tube, extending from the orifice into the lamp towards the outlet; and between the latter and the top of the tube is fixed a curved plate or baffle, having a greater area than, and having its convex side next to, the top of the tube. Thus the entry of wind into the chimney "is rendered very difficult; and in the event of any finding ingress, the baffle and tube effectually hinder it from entering the lantern."

The door is formed on its inner

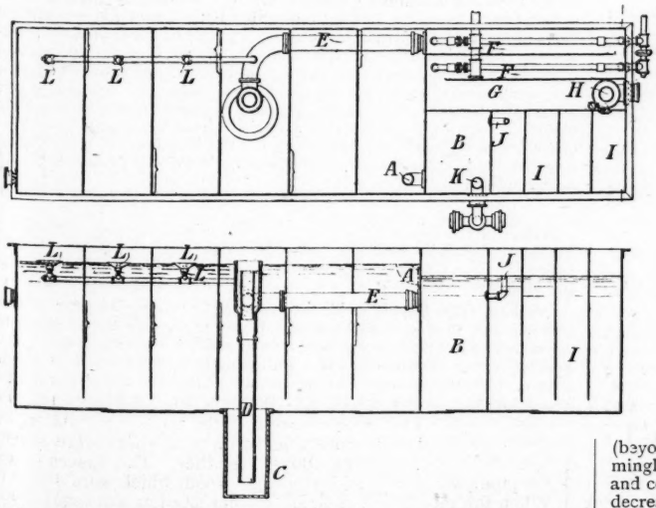


side with a moulding or rib to fit into a corresponding channel in the lantern frame; so that, when the door is shut, the entry of wind is prevented. This construction may be reversed—that is to say, the moulding or rib may be on the frame and the groove or channel in the door. In either case, soft packing may be interposed between the rib and groove to further ensure air-tightness.

Instead of puttying the panes, or securing them in position as ordinarily, the frames are grooved to receive the panes, and also asbestos or like material whereon the frames abut; and in this way, as the panes expand by the heat when the lamp is lighted, air-tightness is obtained. At the bottom of the lantern is an opal plate fashioned to rise from its margin to the centre, whereby inclined sides result, which serve to deflect the light laterally. Of course, this plate is perforated to allow the burner to pass through it.

Treating the Liquor Obtained from Washing, Scrubbing, Cooling, or Condensing Carburetted Water Gas to Separate the Tar from the Water.—Thuman, F., of Victoria Street, Westminster. No. 12,994; July 18, 1900.

In the manufacture of carburetted water gas (the patentee points out) "the gas which issues from the producing plant at a high temperature and laden with tarry vapours, is passed through vessels in contact with water, whereby it is cooled and the tar eliminated. The resultant liquor from these vessels is an intimate mixture or emulsion of tar and water, which must be separated in order that the tar may be commercially valuable and the water capable of re-use. If the liquor be allowed to remain for a sufficient length of time in a settling-tank, separation will occur—clear water accumulating at the upper part and the tar settling at the bottom; but the tar will not be entirely free from water, which can only be completely eliminated by distillation or treatment with heat." The present invention has for its object to facilitate both the separation of the tar and water by settling, and the elimination of any water in the resultant tar.



In the illustrated arrangement, the mixture of tar and water is led into a tank of rectangular form, and divided into compartments by partitions extending from the top to near the bottom, and each is formed with an opening—the openings of alternate positions being near the opposite sides of the tank, and the openings of the several partitions being about midway between the top and the bottom. The mixture of tar and water admitted to the tank is thus made to traverse a zig-zag course through the tank. The current is also maintained in one zone, above and below which the liquor remains comparatively free from agitation—thus facilitating separation. The water escapes from the last compartment through an overflow-pipe A (the entry to which is at the level of the surface of the water) into a compartment B, whence the clear water overflows or is pumped for re-use. The bottom of the tank is provided with a sump or depression C, from the lower part of which the tar flows through the outlet ascension-pipe D. As the partitions do not extend to the bottom of the tank, the tar emulsion flows along the bottom to the sump, from which it is automatically forced by the water pressure up the ascension-pipe, whence it overflows at an adjustable level, through a pipe E, to a secondary separator, wherein it is heated to a condition in which it gives up its water in emulsion. This secondary separator comprises one or more heated chambers or compartments in the form of troughs F, each of which has arranged in it heating piping, through which (preferably) waste exhaust steam is made to pass. As the emulsion flows very slowly through these troughs along the hot pipes, it becomes heated to the condition in which it gives up its contained water. The outlets of the troughs allow the tar and water to flow into a settling chamber G, where the tar settles to the bottom, while the liberated water rises to the top; the former leaving the chamber from the bottom by means of an ascension-pipe H, while the latter escapes through an overflow-pipe from the surface.

This liberated water may possibly carry with it some discolouring tarry matter; but where it is desirable that the effluent should be perfectly clear (as when it is to be discharged into a sewer), the liberated water may be treated in a supplementary gravity or settling separator comprising a series of compartments I, separated by partitions, and similar in construction to the primary separator previously described, but on a smaller scale. J K are clear water outlets from the supplementary separator and the clear water compartment B respectively.

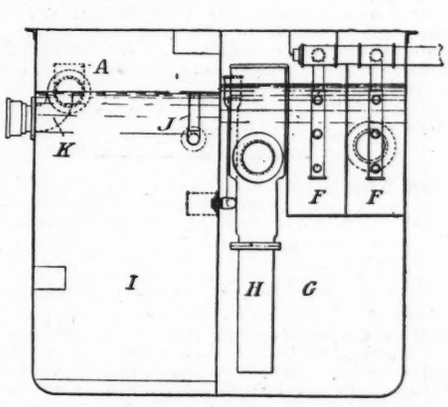
It sometimes happens that some of the tar in the liquor being treated is lighter than water—due usually to gas or air in emulsion—and therefore rises to the surface instead of settling to the bottom in the primary separator. In order to drain this into the emulsion separator, adjustable surface overflows L may be provided in any of the compartments of the primary separators. In the examples shown, each of the first three compartments has an overflow, all of which deliver into a common pipe which drains into the tar discharge-pipe E.

Gas-Igniting Devices.—Martini, A., of Berlin. No. 15,550; Aug. 31, 1900.

This invention relates to gas-igniting devices for use either with incandescent mantles or with open gas-flames. One igniting device has the igniting pill carried by means of the energy of the flame out of reach of the latter; and as it is placed inside the chimney or shade, or inside the dust-protector, it is partially or totally invisible.

Incandescent Burners.—Jenks, A. L., of Buffalo, U.S.A. No. 9468, May 7, 1901.

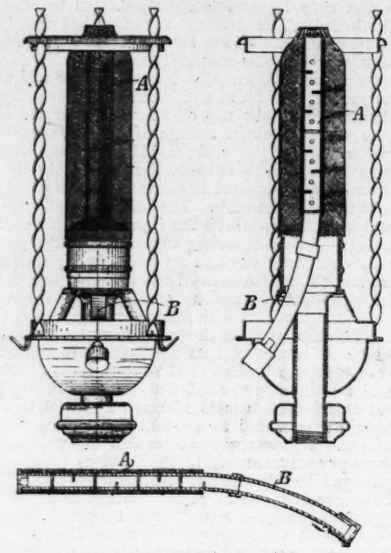
This invention relates to means for increasing the volume of air admitted to a device employing a gaseous illuminating or heating agent, and by admitting currents of air within the combustion-chamber



(beyond or above the igniting points), and permitting it to intimately mingle with the partially-consumed gas; thereby ensuring "more perfect and complete combustion, increasing the illumination or heating, and decreasing the quantity of gas consumed."

The burner-body is provided with the usual mantle base, having a woven-wire or gauze top and a chimney support. The adaptation consists in mounting a tube A. (p. 454), having perforations or openings above the mantle-base, with its lower end extending through the gauze

top and seating in the upper extreme of a lower curved tube B, which passes through the body and communicates with the surrounding atmosphere. The upper tube serves as a support for the mantle, and also as an air-conductor for carrying air into the interior of the mantle



above the igniting-point—the air circulating through the lower-tube into the upper tube, and thence through the perforations into the interior of the mantle, to mingle with the partially-consumed gas; "thus rendering the combustion more thorough and perfect, and greatly intensifying the illumination."

The tube A is preferably constructed of metal, with a loosely encircling supplementary tube of refractory material, which will become incandescent when the burner is lighted and render the tube invisible through the outer mantle. This supplementary tube (owing to its closely woven character) serves to more thoroughly distribute the air-current, and "thereby greatly increase and intensify the brightness of the light."

APPLICATIONS FOR LETTERS PATENT.

15,787.—The Omega Odourless Gas-Stove Company, Ltd., and Strong, H. O., "Gas heating apparatus for drying clothes and warming flat-irons." Aug. 6.

15,805.—Burger, F., "Gas-engines." Aug. 6.

15,822.—Price, H. A., and Turner, H. C., "Grill pans for gas cooking-stoves." Aug. 6.

15,846.—Hendler, J. J., "Manufacture of acetylene and other gases." Aug. 6.

15,907.—Vaillant, J., "Safety bye-pass device for gas and other lighting and heating." Aug. 7.

15,968.—Thompson, W. P., "Automatic safety gas-valves." A communication from H. Rostin and S. Szubert. Aug. 8.

15,989.—Hayman, A. F. P., "Stoppers for inclined retorts." Aug. 8.

15,990-91.—Lux, H., "Liquid combustible incandescent gas-lamps." Aug. 8.

16,015.—The Omega Odourless Gas-Stove Company, Ltd., and Strong, H. O., "Tables in combination with gas and other stoves." Aug. 9.

16,043.—Dibdin, W. J., and Woltereck, H. C., "Producing fuel gas." Aug. 9.

16,055.—Lake, H. H., "Producing a mixture of gas and air." A communication from the "Selas" Gesellschaft mit beschränkter Haftung. Aug. 9.

16,064.—Boult, A. J., "Gas-meters." A communication from La Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. Aug. 9.

16,099.—Boult, A. J., "Gas-burners." A communication from R. Granjon and E. Isnard. Aug. 10.

Bradford Water Supply.—Last Tuesday, the storage of water in the reservoirs on the high, low, and intermediate levels at Bradford was 560,732,000 gallons less than on the corresponding day of last year; and the actual quantity (1,068,175,000) was estimated to last to the 23rd prox.—a period of 41 days. On Thursday morning, there was approximately an increase of 0·5 inch in the supplies available for the city. During the past few weeks, the supply has been diminishing at the rate of 8 or 10 million gallons daily.

Walsall and the Supply of Mond Gas.—At the meeting of the Walsall Town Council on Monday last week, a report by the Parliamentary Committee, setting forth the position of the Corporation under the Mond Gas Bill, as passed by Parliament, was presented. The Committee considered the Council and the town were to be congratulated on having forced the Mond Company to lay their mains within a reasonable period, as if there was any value in Mond gas for the local trades, the large manufacturers would be in a position to demand a supply within that time, and if not provided the Corporation or any other company could apply for parliamentary powers. The Mayor (Mr. W. J. Pearman Smith) remarked that something had been said about the enormous cost incurred by the Council in opposing the Bill. The total cost in both Houses was less than £1200; and as to the propriety of the Council opposing the measure, this, he thought, had been fully justified by the result. The report was adopted.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following Bills received the Royal Assent last Saturday, and the session was brought to a close: Aldeburgh Corporation (Water) Bill, Burgh Sewerage, Drainage, and Water Supply (Scotland) Bill, Derby Corporation Bill, Devonport Corporation (Gas) Bill, Ilkeston and Heanor Water Board Bill, Leeds Corporation (General Powers) Bill, Leeds Corporation Water Bill, Rugby Water and Improvement Bill, Stratton and Bude Improvement Bill, Wallasey Improvement Bill.

LEGAL INTELLIGENCE.

Thefts from the York Gas Company.

A gas-fitter, named John Shepherd Humphries, in the service of the York Gas Company, was last Thursday accused of stealing a gas-stove, a quantity of lead piping, and a number of incandescent burners, globes, &c., the property of the Company. He was also charged with stealing gas between Dec. 31, 1899, and the 8th inst. The gas had been stolen by disconnecting the main supply pipe. The prisoner pleaded guilty to both charges, and was sentenced to six months' imprisonment for each offence—the sentences to run concurrently.

Meter Robbery at Hanley.

At Hanley last Tuesday, Herbert Mayer, aged 17, was charged with breaking and entering a dwelling-house in Portland Street, and stealing 6d. from a slot meter, the property of the British Gaslight Company. The accused was seen to take a pane of glass out of the kitchen window, during the absence of the inmates of the house. He then entered the house; and it was afterwards found that the slot meter had been forced open and the money taken away. When the prisoner was arrested and charged with the offence, he admitted his guilt, and said he was sorry. The accused had been previously convicted; and the Magistrates committed him for trial at the Quarter Sessions.

The Trade Secrets Case at Leeds.

At the Leeds City Police Court last Thursday, before Mr. C. M. Atkinson (Stipendiary Magistrate), Charles Duncan, of Granby View, Headingley, was again charged, on remand, with having stolen appliances and material for the manufacture of gas-burners from Messrs. George Bray and Co., gas-burner makers, of Bagby Works, Leeds, by whom he was formerly employed. The previous proceedings in the case were reported in the "Journal" for July 30 (p. 288). Mr. George Bray was the first witness called. He placed the intrinsic value of the goods alleged to have been stolen at about £10. As to the acetylene burners, he thought £1 apiece would be a fair value; but it was not the value they would get in the market when they started selling. As specimens, which they would now have to reproduce, a moderate price would be £1. The first burner made would certainly cost no less than £1000, because the firm had been engaged upon it for five or six years—manufacturing and destroying machinery, &c., until ultimately the article in question was produced. Mr. J. W. Bray, son of the previous witness, and Mr. W. D. Helps, of Messrs. J. Milne and Son, having given evidence, the prisoner, who reserved his defence, was committed for trial at the sessions; bail being allowed.

Leaky Gas-Mains at Bexhill.

A claim made by Earl De la Warr and others against the Bexhill Gas and Water Company for £10 10s. and an injunction, was down for hearing at the Hastings County Court on Monday last week. The amount named was for damages alleged to have been done to plaintiffs' trees in three roads, through the defective state of the defendant's gas-mains. Mr. Boxall (for the plaintiffs) intimated that the parties had come to an arrangement, and there would be judgment by consent for the sum claimed, with costs on the higher scale. On defendants (for whom Mr. Corrie Grant, M.P., appeared) assuring plaintiffs that they would do their best to prevent leakages of gas in the roads named, the claim for an injunction was withdrawn. His Honour Judge Martineau confirmed this arrangement, which was made without prejudice to any future action.

Reductions.—To the reductions in the price of gas already announced, we have this week to add the following: Alnwick, 4d.; Sheffield, 2d.; Bridport, 2d.; Cardiff, 3d.; Falmouth, 4d.; Maidstone, 2d.; Yeadon and Guiseley, 1d.

Evesham Gas Supply.—At the meeting of the Evesham Town Council last Wednesday, Alderman Lowe, in moving the adoption of the report of the Gas Committee, stated that the coal contracts for the ensuing twelve months showed a reduction in cost all round of 2s. 6d. a ton. The accounts for the year ending the 31st of March had just been audited. At the beginning of the year, the Committee were very anxious because they were using 2000 tons of coal, and the price had advanced by 5s. a ton. Gas companies and corporations all round had raised the price of gas; but the Committee decided not to increase it, as they hoped the improved price of residuals, &c., would meet the difficulty. This hope had been realized. The revenue account showed the total payments to be £3988, against £3179 the year before; and the cost of coal to be £1923, against £1478. The sale of gas amounted to £3756, compared with £3444; and the sale of coke and residuals to £1203, instead of £810. The total receipts were £5413, against £4594. The report was adopted.

MISCELLANEOUS NEWS.

SOUTH METROPOLITAN GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held at the Cannon Street Hotel, E.C., last Wednesday—Mr. GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Frank Bush) having read the notice convening the meeting, and the minutes of the last ordinary and extraordinary meetings, the seal of the Company was affixed to the register of shareholders, and the report, with the statement of accounts for the half year ending June 30 (*ante*, pp. 349, 400), was presented

The CHAIRMAN: Ladies and Gentlemen,—It now becomes my duty to move—"That the report and accounts now presented be received and adopted, and the report entered on the minutes." Of course, as usual, the report will be taken as read; but before I deal with it, there are one or two matters in the accounts to which I should like to refer. The first is the question of capital; and it is a satisfaction to your Directors to be able to present to you an account which shows that the capital expended, which you see in the account is £4,141,173, is only about £3 10s. per ton of coal used in the year. This, I am happy to inform you, is really less than the value of the concern. This business could not be started for the money that is represented by the capital; so that instead of being over-capitalized we are rather the reverse, which is a very satisfactory position. That is due partly—in fact, rather largely—to the great improvements we have made in our various works during the last ten years. The old works have been to a great extent renewed. In the revenue account (No. 4) you will see an item "Repairs and maintenance of works and plant, £103,166." That is a large figure; but it includes not merely repairs and maintenance, but renewal. What we have done has been this: When any plant has become obsolete, we have renewed it with something better; so that our works are now in a much better condition than they were some years ago. The only other item in the account which I should like to refer to is a rather singular one. In the June half of last year we paid for rates and taxes (which really is rates) £31,033. There has been a re-valuation of the Company's property and business, and this half year the rates are £30,915. It is only £118 less than the previous year; but it is something unique to find rates rather less than considerably higher. And here I may say that this, I think, is the result of a good twenty years' struggle. Ever since the amalgamation, we have been struggling with the rating authorities; and we have generally had to appeal to the Sessions. Some of the parishes were always reasonable and fair, but others tried to get the best of us; and consequently an appeal was made at each quinquennial re-assessment. I think we went to the Sessions in 1880, 1885, 1890, 1895, and we were going this year; but we have at last got the rating settled on what we consider is a reasonable basis. Of course, we think it is rather too high now; but it is satisfactory in that it is uniform over the whole of the Company's district. The high-rating parishes are brought down to the level of the reasonable ones. This I regard as satisfactory; and I think that there is a probability of this satisfactory condition being maintained. I now turn to the report. We endeavour to give to you as full an account as possible in our half-yearly reports. The principle on which the Board act is that the business is the property of the shareholders, and that, as such, they are entitled to as much information as the Board are able to give them within the compass of a report. That is the reason why our reports are longer than those of some other companies. The first paragraph deals with the price of coal. It is so explicit that it expresses all I have to say; and I do not propose to comment upon it. Shortly, it means this: That coal, which was 6s. 6d. a ton three years ago, went up to 8s., then to 16s., and is now back to 9s.; and we were fortunate enough to come into the market at a time when it was at its lowest point this year. I think coal has hardened a little since then. We bought at 9s., which is a reduction of 7s. on the previous year; but this is not all gain. As coal has gone down in price, so has coke in quite as great a proportion. In fact, coke which was sold under contract last year at 22s. a ton is now being sold at 12s. 6d. I am happy to say we are making very good progress with our contractors at that price, which we think is a fair one. The next paragraph is one which has given your Directors considerable satisfaction. It relates to the reduction in the price of gas. It was with very great regret that they raised the price, and it was with unqualified satisfaction that they reduced it. I think all gas people are convinced that increases in the price of gas are detrimental; at any rate, the increase made last year showed itself at once in the diminished consumption. We had had a large increase up to the date of the announcement of the increase in price last June twelvemonth; but immediately it was announced, the increase fell off. Averaging 10 per cent. the two previous half years, it fell off to 2 per cent., and remained at that increase during the whole twelve months during which the high price was continued. Since the reduction from 2s. 8d. to 2s. 3d. the increases have begun again, and now average 9 per cent. so far during the present half year. The satisfactory part about the increases in the consumption of gas is this, that by them we are enabled relatively to reduce the charge for capital. Our business grows faster than the capital, with the result that whereas twenty years ago it cost us more than 14d. per 1000 cubic feet to pay the dividend we then were paying, it now costs us 7¾d. per 1000 feet to pay a higher dividend than we were paying then. That, I think, is one of the sheet anchors of the Company—that we are continually, by the increase of business, enabled to reduce the relative charge for capital; and this gives us assurance of continued stability. The next paragraph relates to the development of the use of gas by the slot meters. The only reference I would make to that is by quoting the last sentence of the paragraph: "There is in this business a double satisfaction; it is an advantage to the Company, and evidently supplies a want by adding to the comfort and safety of the wage-earning class." I may tell you, ladies and gentlemen, that we regard our position in this light: The Directors—and our officers are all acting in the same spirit—are here not merely to earn dividends for the shareholders, but to carry out a great public duty and a great public service; and the better we can perform that duty, and the greater satisfaction we can give to the consumers, the better it is all round. An interesting incident occurred only recently—I should not mention it, because it refers to myself, but I take it as referring generally to the Company. There was a dispute with a consumer about an account. Our officers dealt with it, and contended that the account was right; and this gentleman contended that he could not have burnt the quantity of gas. At last our officers suggested that there should be a friendly reference to the Court—that it should be left to a magistrate to decide. Well, the last reply of this gentleman was: "I do not want to go into Court about it, wasting money." It was a small amount that was in question. He said: "Let your Chairman decide it." I do not happen to know him, I know nothing of him personally. "I would rather have his decision than that of any magistrate or jury." That shows me this, and that is why I have stated it, that our officers are acting in a right spirit towards our customers. If that gentleman had been met in an abrupt and curt manner by the officers of the Company, he would never have had the confidence in the Company that he displayed. The next paragraph relates to the Bill—it is an Act now, as it received the Royal Assent on Monday—which you authorized us in February to apply for. That Act had three objects. One was to obtain power to purchase the Southern district and works of the Gaslight and Coke Company and to obtain authority to raise money for the purpose. Another was to raise additional capital for the ordinary purposes of the Company; and the third was to obtain power to issue that stock by direct offer to the consumers at a fixed price. Hitherto we had done it in a roundabout way. We had been compelled by the Act to advertise it for sale by tender. We usually got very few tenders; and then, after a month or six weeks had elapsed, we had authority to offer it to the consumers at the minimum price fixed in the tender. But in six weeks there might be great changes in the value. Well, Parliament has met us in the matter and has given its consent, in spite of very strong opposition by the London County Council, who do not like us issuing stock to our consumers. I think one reason is that we thereby make friends; and some of these people do not want us to have friends. Our object is to make as many as possible. Parliament has given us that power; it has given us all the capital we asked for; and it has given us power to purchase the Southern district subject to a condition that the Gaslight and Coke Company shall submit themselves to Parliament. That was a perfectly reasonable condition, and we never expected to get the authority without it. Paragraph 5 relates to the question of electrolysis of gas and water pipes. It is found that the promoters of electric traction companies wish to be free from any obligation whatever to keep their current from injuring other people. Electric traction is worked by conductors which convey the current to the car, thence to the rail, and then it has to find its way back to the generating station as best it can. They say it can travel along the rails. Well, an electric current will not always travel where people say it ought to travel. It leaves the rails and gets to the gas and water pipes; and unfortunately in travelling along gas and water pipes, when it leaves the pipes, it carries away some of the metal. We have had instances of pipes that would have practically lasted for ever, as cast-iron pipes in the street are everlasting, which have been corroded and eaten away by these electric currents. We say to Parliament: "Make these people responsible for the mischief they do." If we allow our gas to escape, and it does any injury whatever—if it contaminates water, if it causes explosion, or any inconvenience or annoyance—we are responsible, and rightly so; and if damage is done, we have to compensate for it. All we say is: "Deal out even-handed justice towards us in regard to this electrolytic question. If these people allow their currents to escape, they do mischief to other people; make them pay the damage." It is so obviously fair, that I have no doubt we shall secure the protection we need; but we shall have to struggle a little longer for it. The next paragraph is perhaps the most important one with which I have to deal. It is about the reduction in the illuminating power of the gas. For a great many years the public authorities have all been on the wrong tack. Whenever a gas company have gone to Parliament for additional powers, they have always opposed them—pretending to be the representatives of the consumers. Now, I may say, these people have never done a particle of good by all their opposition, but an infinity of harm; and one of the methods by which they have done so much harm has been in inducing Parliament to compel the companies to continually increase the illuminating power of gas. From ordinary coal, gas of a certain quality can be obtained; but then they said: "We must have something better." The quality used to be 12 candles, then it was 14, and then 16, and they wanted more. To give this higher quality, it is necessary to adopt methods of enrichment—I call it adulteration—putting something in the gas that does not properly belong to it. At any rate, gas companies all over the kingdom have been forced to adopt methods of enrichment in order to comply with the requirement to supply gas of a certain quality. This enrichment is uncertain in its action. Cannel used to be employed; but it became impracticable from its rarity and costliness. Then petroleum spirit was adopted, which is very convenient, but to some extent uncertain. Gas carries it under some circumstances, but not under others. Then carburetted water gas has been introduced; but that also is objectionable. In fact, the methods of enrichment which have been adopted have entailed, and are still entailing, enormous loss on the consumers of gas throughout the country. I do not think I should be wrong if I were to say it is amounting to millions per annum. A penny per 1000 cubic feet on the whole of the gas used in the kingdom would amount to about £600,000 per annum; and I am quite certain the cost of enrichment amounts to several pennies, and for no good. Moreover, the loss is not on the gas company; it is on the consumer, who has to pay for it. Last year we went to Parliament, and we fortunately had a thoroughly capable and strong Committee who heard our case; and notwithstanding very strong opposition from the London County Council again, they listened to us, and gave us what we asked for. We asked that the quality of gas that we should be required to supply should be reduced from 16 to 14 candles. The Chairman of the Committee put a question to me while I was giving evidence. He said: "Why do you stop at 14 candles?" I imagined this meant that we had proved our case for a still lower quality. I said: "We stop at

14 candles because we think that is as much as Parliament can swallow at one dose;" and there was a general laugh at that. I think we are not going to stop at 14 candles. As the last century was the century distinguished for gaseous lighting—lighting by means of gas—so I think the century on which we have entered will be the century when gaseous fuel will be the predominating thing. It is being very largely and increasingly used for all sorts of purposes; and it is my belief that gaseous fuel will be, before many years are over, in general use in our towns for lighting, heating, and power purposes. That is the best way to get rid of the smoke nuisance; and if we are to have gaseous fuel, it must be gas of low illuminating power. But what is the use of talking about the illuminating power? Here is the annoyance to which we are subjected. In the report there is a little paragraph: "I certify that the above accounts are correct. A forfeiture incurred during the half year, amounting to £2, must be borne and paid exclusively by, and out of, the divisible profits of the Company, and by way of reduction of dividend." So our dividend is to be reduced by £2 somehow. Gas testing is an uncertain process; and whereas 16 candles is the limit, Parliament said there should be no penalty unless it falls below 15½. It fell 1-100th part of a candle below 15½; and the London County Council takes us into Court and treats us as criminals, and we were fined £2. The absurdity of this nonsense of fractions of candles I shall have another word to say about presently. Any of you ladies and gentlemen can take the gas in your own houses, and you can make it 5-candle power or you can make it 125-candle power with the greatest ease. It all depends on the way in which you burn it. If you use the worst kind of ordinary burner—such as there are, unfortunately, a great many in use now—you will only produce light equal to 5 candles for 5 cubic feet per hour. They are the very worst burners; but there are a number of burners which do not give a light of 10 candles from 16-candle gas. If you have better burners, you can get a better light; and if you have the Welsbach mantles, you can get 125 candles. It may be 14 or it may be 12 candle power gas, it would be just the same. You may get from it something under 10-candle power, or you may get from it something equal to 120-candle power. Yet there is all this fuss and nonsense about fractions of candles. If it did the public any good, I would have nothing to say about it; but it does the public no good, but rather does them a great deal of harm, because it distracts the attention of managers. When I was in office, these daily tests were a matter of anxiety to me every morning. You may think everything is right, and then the test comes and it is wrong. It worries our engineers and managers. I have told them to take no notice of it, and not to trouble themselves at all. If it is wrong let it be wrong. Let them summon us, and we will take the consequences. The consequences are not very serious; but there is rather an amusing thing here. The £2 is to be borne and paid exclusively out of the divisible profits of the Company. There is one way to do it, and that is to divide the £2 over the whole £144,000. This has been done by a London Company; a few pence have been deducted from each dividend warrant. We never did that, and we are not likely to do it; but it so happens that on this occasion we are paying a dividend up to the hilt. We are going to recommend a dividend of 5 per cent., and we cannot pay anything more. We have usually paid something a little under the legal dividend. If we have had a penalty, we have usually paid it out of the balance; but now we have no balance. How are we to do it? The Company have invested their renewal fund of £21,000 in the Company's stock. Of course, we shall deduct the £2 from the dividend that is due to this renewal fund; and if it had been £200 we should have done the same. I confess that my mind is so constituted that I feel a little satisfaction in showing the futility of these penalties. If Acts of Parliament penalize us in this way, what are we to do? We cannot divide the amount over the whole of the shareholders, and so we shall take it out of this renewal fund, and nobody will be any the worse, or any the wiser either. I believe the time is coming—and it is not very far distant—when we shall have to go for a further reduction in the illuminating power. In order to get this 14-candle power from Parliament, we made a concession which I would advise other gas companies not to make. We agreed to a reduction of 1d. in the initial price for each candle below 16. So we agreed to an initial price of 2d. less, so as to get this reduction to 14 candles. That was rather too much; but it was worth doing, in order to get the principle established. The next paragraph refers to the officers and workmen; and I should like to read one sentence to you. "In reference to the officers and workmen, the usual statement may be repeated. They are animated generally by such a spirit of goodwill to the Company, that there is never a difficulty, never a care or a moment of anxiety, so far as labour is concerned, to interfere with the working of the undertaking." Of course, with a large number of men, we find one or two black sheep—possibly Socialists, of whom we have got rid of one or two with advantage. I have no doubt there are a few who are traitors to us; but, speaking generally and broadly, these words are perfectly true. It is true we never have a difficulty, and even with those who are disaffected there is none. If there are such, we do not know who they are, and we never have any anxiety. The next paragraph I shall have to deal with at the special meeting. With regard to the increase in the Secretary's salary, I should have to speak about that in the special resolution, so I will say nothing about it now. The last paragraph relates to the profit. We have had a prosperous half year—in fact, so prosperous and so satisfactory has it been that really I might have attended this meeting and simply moved the adoption of the report, for there was nothing particular to say. We have a surplus on the half year; we are able to carry £14,671 to the insurance fund, and to carry forward £21,568. I may say a word about the insurance fund. It now amounts to £69,646. That is to meet any loss resulting from an accident, such as a fire, or loss by a strike. We had £40,000 in the fund at the time of our strike, and we took £30,000 of it to partly pay the cost. We have now £70,000. As to a strike, I think everybody agrees we shall never have that again—it is absurd to talk about it; but there are other things that might happen to us. A good many years ago there was what was known as the Wood Street fire. A man was laying on the gas to one of the warehouses in Wood Street, and, by some means or other, gas escaped from the pipe he was putting in the building. There was in the basement a naked light which set fire to the building, and an enormous sum—I think £120,000—had to be paid as compensation for the damage done. Then there was the fire at Saville House, in Leicester Square, where the gas had been cut off and the meter taken away; but somebody turned on the tap, and set fire to the building, and there, I think, the compensation was £90,000. At any rate, these two accidents alone cost the Companies concerned something like £200,000; and it is in order to provide against the possibility of such disasters that we think it advisable to make the insurance fund larger. With these words, ladies and gentlemen, I have much pleasure in moving the adoption of the report.

Mr. JOHN MEWS seconded the motion.

Mr. HUNTLY JENKINS said he noticed in the report that the Bill gave the Company power to raise a million of share and loan capital in addition to another million if the transfer of the southern district of the Gaslight and Coke Company took place; and he should be glad to know whether this meant that the Company could raise a million, whether the transfer took place or not.

The CHAIRMAN said they had power to raise two millions—£1,500,000 of ordinary stock and £500,000 on loan; but if the transfer did not take place, these figures would be reduced by one-half.

Mr. HUNTLY JENKINS asked whether, if the stock was not taken up by the consumers, it would be issued to the proprietors.

The CHAIRMAN said it would be offered to the proprietors at the same price.

The motion was then put and carried unanimously.

The CHAIRMAN next moved—"That a dividend at the rate of 5 per cent. per annum be now declared, and that the warrants be transmitted to the registered addresses of the proprietors by post." He said this was the full dividend they were entitled to declare at the price at which gas had been sold during the past half year. If they made enough profit, they could increase the dividend on the next occasion; but for the past half year 5 per cent. was the maximum they could pay.

Mr. J. A. BUTCHER, in seconding the motion, said he had no doubt everyone would be glad to have as large a dividend as possible; but to keep the concern safe and sound, the Directors rather preferred to pay a lower dividend than a high one. At all events, they were safe in paying a dividend at the rate of 5 per cent. Speaking on behalf of the workmen, he could assure the shareholders that the days of strikes or discontent were over. Sometimes they, as Directors, felt a responsibility in this matter, because a great deal had been done on behalf of the employees for which they were very grateful; and so long as that gratification lasted, he thought he might say that they would never be troubled with any labour disturbance. Certain influences were at times brought to bear upon the men, and unfortunately there were weak-minded men who were led away; but this did not affect them materially. Earthquakes might occur and revolutions come about; but so far as the working of the Company was concerned, the men knew where their best interests lay, and they were determined to preserve them, and in preserving their own safety they were safeguarding the interests of the shareholders.

The resolution was then put and carried unanimously.

The CHAIRMAN: I have now a very pleasing duty to perform for my friend on my left. Mr. Bush has been with us now come next February 20 years. He succeeded me in the office of Secretary. A more devoted and more faithful officer the Company could not have, and I may say that his responsibilities are very considerable. It is a large concern now, as you may see by looking at the accounts and noticing that the turn-over in a half year exceeds £1,000,000. There is a large staff to deal with; and I am pleased and proud to think that Mr. Bush has managed to deal with the staff in a manner that is exceptionally satisfactory. There is never a difficulty of any kind. Any man if he likes can appeal to me against what he thinks an unjust decision; but I never have had such an appeal. Mr. Bush is always accessible to the staff, and I am quite certain thoroughly acceptable to them, and at the same time he does his duty faithfully to the Company. He has also largely to do with the sale of coke and sulphate of ammonia. The receipts from sulphate of ammonia amount to £60,000 a year, and they will soon amount to £80,000 or £90,000. He has to deal with contracts for coke which amount to £200,000, and has also very largely to deal in the matter of coal contracts. Of course, the Directors settle the coal contracts; but there is a great deal of negotiation which goes through Mr. Bush, and I may say he is a man thoroughly devoted and loyal to the Company. Under these circumstances, I feel it is only just we should increase his salary. The Directors simply say: "That the salary of the Secretary be increased £300 per annum from the 1st of July last." The Directors have the power to fix all the other salaries; but the salary of the Secretary has to be fixed by the shareholders. I think you will understand that it is not pleasant to have it advertised all over the world what a man's salary is. I can tell you that it is not an excessive amount; and I will therefore ask you to refrain from asking me what is his salary. It certainly is not excessive, and the £300 a year will only bring it up to what I consider a fair amount. I beg to move "That the salary of the Secretary be increased £300 per annum from the 1st of July last."

Captain THOMAS B. HEATHORN, R.A.: It is my great pleasure to second this proposal of the Chairman for raising the salary of our Secretary. Our Company, like many other companies, and perhaps unlike others, happens to have a very efficient staff. The machinery and the working of our staff cannot be beaten by any other Company in the world; and the great beauty of a machine is its working pleasantly, smoothly, and without friction. The less friction there is, the better the machine; and I am therefore on that reasoning proud to second the proposition of the Chairman.

Mr. G. HOGARTH, speaking on behalf of the shareholders, said he felt sure that the motion would receive their cordial support, as Mr. Bush had shown great administrative ability in the affairs of the Company.

The resolution was passed unanimously.

The SECRETARY, who on rising was received with loud applause, said: Mr. Chairman, Ladies, and Gentlemen,—So many kind things have been said about me that I confess I feel somewhat unnerved; but I should endeavour to be as composed as possible under such pleasant conditions. I feel, Sir, that you have spoken of me far beyond my deserts; and I thank the shareholders very heartily for the kind way in which they have adopted the resolution which has fallen from this side of the table. I have endeavoured conscientiously to carry out my

duties, and have been assisted by a loyal and devoted staff; and I feel, Sir, very proud indeed to think that I have your confidence and that of your colleagues, and also that of the shareholders. I would desire, Sir, to thank you personally on this occasion for your kindness, for your support, and for your guidance; without them I do not know how I should have got on. Ladies and gentlemen, I feel that I have said sufficient. I feel also that I am talking about myself, which is not desirable, and it is distasteful to me; and I will conclude by saying how very much I appreciate the kind and liberal addition which you have voted to my salary.

The CHAIRMAN: That concludes the business of the ordinary meeting.

Special General Meeting.

The CHAIRMAN: Three years ago, we introduced what was then regarded as a great innovation—a scheme for the election of Workmen Directors. By our system of profit sharing, half the annual bonus is invested in the Company's stock; and in addition, the workmen have invested a large amount of savings, so that the value of their holdings at the present time is much over £100,000. Besides that, they have about £40,000 on deposit with us at interest. About three years ago, the amount was something like £60,000—that is, the market value. You passed this scheme. There was a little difficulty about it, and I am not going to blame or suggest one word of reproach to those gentlemen who objected. It was a decided innovation—it was an experiment—and their objections certainly were objections that might have proved to be justifiable. We have now been going on for three years. The officers did not elect their Director, but the workmen elected two. First, they elected Messrs. Austin and Butcher—the gentlemen you have seen here from time to time. I could form no conjecture as to how the workmen would go on year after year. I thought probably they would say: "Well, now you have had your innings, let somebody else have a turn," and changed from time to time. Mr. Austin was the first to retire, and was re-elected almost unanimously. At any rate, there was only one competitor, but he had no chance. The next year Mr. Butcher had to retire; and he was returned in just the same triumphant manner So these two gentlemen have been sitting with us during the whole three years. By the terms of the scheme and of the Act of Parliament, this scheme was to be for three years and no longer; and after that if the shareholders think it right, they may approve another scheme for any period prescribed. As the scheme is at an end, we come before you with a new one. I think I had better read one or two of the clauses. Clause 2 provides: "This scheme shall come into operation as soon as it has been adopted by the shareholders of the Company in manner provided by the South Metropolitan Gas Act, 1896, and approved by the Board of Trade, and shall continue in force for nine years, subject to cesser, if the amount of the investment of the employees in the stock of the Company shall fall below the nominal amount of £40,000, or if the shareholders, as herein provided, shall determine that its continuance is not advantageous to the Company." It is felt—and I feel it just as much as anybody else—that it is necessary that the power should remain with the shareholders. Though our workpeople and employees have over £100,000, the general body of shareholders have £5,000,000 or more; and therefore the power of dealing with matters of importance ought to, and must, remain with the shareholders. Therefore, it is provided that, though this scheme is for nine years, it may be determined at certain periods. Clause 3 provides: "At the August half-yearly general meeting in 1904"—that is three years hence—"and again in August, 1907, the Directors shall specially report to the shareholders on the working of the scheme; and should the report, in the opinion of the shareholders, be unsatisfactory, and the system detrimental to the interest of the Company, the shareholders shall, at the end of each three years, have power to determine the scheme by giving six months' notice." It is not to be a scratch notice—it is not to be sprung upon us. "Such notice shall be given at the August meeting that at the half-yearly meeting in the following February a resolution will be submitted for that purpose. Notice of such proposed resolution shall be sent to every shareholder with the February report, and proxies shall be sent therewith. A majority of votes, in person or by proxy, shall determine the issue." That is, that every third year the matter shall come under the review of the shareholders. The Directors shall specially report to them; that report will be sent out with the half-yearly report; the shareholders will have time to consider it, and if they think it detrimental to the interests of the Company, they can come to the August meeting in 1904 and give notice of motion to determine it in the following February. For my part, I have no fear of this. If the system of Workmen Directors cannot stand this test, it is of no use. I feel certain it will stand the test. It is quite possible we might have a director elected by the workmen who would not be equal to our friends here. But, so far, the workmen have selected men eligible in every respect; and there is no reason to suppose they will fail in making a similar selection. The other part of the scheme relates to the method of voting, which is the same as in the previous scheme; but there is an alteration made in the clause about the fees. "The employee Directors shall have their ordinary duties and the pay attaching thereto suspended during the time that is found to be necessary for their duties as Directors. The fees for their service as Directors shall be the amount they would have earned if they had been at their ordinary employment, *plus* £1 1s. for each weekly attendance." In the former scheme, it was put at half-a-guinea. The Board have unanimously agreed to recommend that the fee to the employee Directors under the new scheme shall be a guinea instead of half-a-guinea. It is not for me to say much about this, because I am supposed to be a partisan; but with this explanation I beg to move—"That the scheme now submitted to the meeting for the election of employee Directors, made under the provisions of the South Metropolitan Gas Act, 1896, and the South Metropolitan Gas Act, 1897, be approved and adopted, subject to such alterations as the Board of Trade may suggest and the Directors agree to."

Mr. JOHN EWART expressed his pleasure in seconding the resolution He said it might be within the recollection of some that he was one of the persons to whom the Chairman had referred as having actively opposed the scheme at its inception. While he still retained many of the opinions and objections—perhaps the shareholders might call them obstinate prejudice—as to the general desirability of such a scheme, he was bound to admit that, in the case of the South Metropolitan Gas Company, it had worked admirably. He attributed the success of the scheme to three main causes. The first was the conservative nature of the scheme itself. As they would see from the scheme, it was safeguarded in many ways, and could be put a stop to when it was found not to work satisfactorily. Secondly, he attributed its success to the excellent sense and judgment shown by the workmen in their selection of Directors. Thirdly, it was due to the tact, good judgment, and capability shown by the representatives of the men. Therefore, on these grounds, he had great pleasure in seconding the resolution.

Mr. HUNTLY JENKINS asked whether it was the desire of the workmen that Messrs. Austin and Butcher should be re-elected.

The CHAIRMAN: We do not know. Mr. Austin will retire almost immediately. Mr. Austin and Mr. Butcher were elected by the workmen in 1898. Mr. Austin retired in 1899, and was re-elected. Mr. Butcher retired in 1900, and was also re-elected. Mr. Austin will retire very shortly, and will stand for re-election. We have nothing to do with the election; it is left to the shareholding employees holding not less than £10 of stock. All the shareholders have to do is to say whether or not the system shall go on.

Mr. STOCK remarked that when the subject was first mooted, there was opposition by certain persons, and he was glad to hear that the scheme had worked so satisfactorily. He hoped it would continue to do so in the future.

Mr. HOGARTH said he was pleased to notice that Mr. Ewart had at last come round to the views held by the majority.

The CHAIRMAN: There is one thing which I forgot to mention as a justification of my friend Mr. Ewart. I may quote the late Mr. Mundella. No one will suppose that he was in opposition to any such scheme as that for having workmen directors; but I consulted him on the point. He said to me: "I like the idea very much; but I have my fears about its working. I have some doubts whether the workman director will rise to the position of a director. I am a little afraid that he will consider himself the delegate and the representative of a class of the workmen only, and that, instead of working for the general good of the Company as a whole, he will confine himself to that one section." That was what Mr. Mundella said to me. He said: "I should very much like to see the experiment tried; but I have that fear." It was very frank of him, knowing his views on the labour question. I am happy to say that the two gentlemen who have sat on the Board with us have risen above the small and narrow view which Mr. Mundella feared. They have taken their position with the rest of us, and we have all treated them as equal with ourselves at the Board. Nothing has been kept back—not a single thing; they have known everything just as much as the rest. They have never betrayed that confidence in the slightest degree; and they have taken a broad and general view of the concern, and have worked to promote its interests as a whole.

The motion was carried unanimously.

Mr. FOSTER proposed a hearty vote of thanks to the Chairman, Directors, and staff for their excellent management of the affairs of the Company during the past six months. He said he hoped shortly to see the price of gas reduced to 2s., now that they were authorized to lower the illuminating power.

Mr. BRYAN DONKIN seconded the motion, and it was carried unanimously.

The CHAIRMAN, in replying, said it was a great pleasure to the Board to have this vote proposed by one of their oldest friends. Mr. Foster had been on the books of the Company for more than sixty years, and he and his family had been the largest shareholders. It was very gratifying to the Board to have such a vote proposed by him, and for it to be carried in the manner in which it had been. The Directors endeavoured to do the best they could for the Company. There were three interests which they had to guard—those of the shareholders, the consumers, and the employees; and they endeavoured to do their best for all three. He thanked the meeting sincerely for the vote. Mr. Foster had taken the wind out of his sails as to the vote to the staff; but he was very glad he had done so because it was very pleasant to have such a vote coming from the other side of the table. He could only repeat, as to the staff generally, very much what he had said about the Secretary. They were all working cordially and loyally with the Directors and with each other, which was a great point. The same spirit went down through the foremen to the workmen. With such a staff and such a body of men, if the Company was not successful he could only say it ought to be.

The CHIEF ENGINEER (Mr. C. C. Carpenter) said, on behalf of the engineering staff, he begged to thank the shareholders most heartily for the cordial vote which had just been passed. The Chairman had done a great deal to make the way of the Engineer a smooth one. He remembered the time when considerable thought was given to asking questions as to how things were going on; but since the profit-sharing scheme was started these questions automatically answered themselves. He looked forward to much good resulting from the alteration in the illuminating power of the gas.

The SECRETARY replied on behalf of the officers, saying he was very much obliged to the shareholders for the vote of thanks. They might rest assured that they would all endeavour to do their best to further the interests of the Company.

The proceedings then closed

The Hyde Town Council have approved an application to the Local Government Board for sanction to borrow £7500 for the purposes of water supply to the borough.

Professor Boyd Dawkins has made an important report to the Water Committee of the Warrington Corporation with regard to the extent of the increased supply of water to be expected from the new wells which have been recently sunk at Winwick as a part of the water-works extensions. The report clearly proves that the extension scheme, so far as it has been carried out, is in every way an excellent one, and will produce the results expected, if not exceed them. He believes, in fact, that the depths to which the Engineer (Mr. James Deas) has arranged to carry the shafts will yield a sufficient supply to meet the requirements of Warrington for twenty years or more.

CRYSTAL PALACE DISTRICT GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday, at the Albion Tavern, Aldersgate Street, E.C.—Mr. GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Charles M. Ohren) having read the notice convening the meeting,

The CHAIRMAN said the first the shareholders heard of the report in the old days was when it was read at the meeting; but a better system had been adopted for many years now. A copy of the report was sent to each shareholder; and therefore the necessity for reading it did not arise. It was now his duty to move the adoption of the report for the past half year; and he was very happy to say that the circumstances were more favourable than they had been during the two previous half years. Before he dealt with the business part of the report, there were two paragraphs—Nos. 6 and 7—to which he must allude. It was, he could assure the proprietors, with very great regret that the Board had received the announcement of the death of their highly and universally esteemed Deputy-Chairman (Mr. Frederic Lane Linging). He had been a Director of the Company for about forty years; and he had been in the gas business practically all his life—anyway, from early youth. For some years, Mr. Linging was with the Equitable Gas Company of London; and he was subsequently promoted to the Secretaryship of the British Gaslight Company, which office he held until his retirement a few years ago, at over 80 years of age. He was a man who was most devoted to his work; and, as an officer of a gas company, no man could have been better. But he (the Chairman) had to speak of him as a Director. Mr. Linging brought to the service of the Crystal Palace Gas Company a very wide knowledge of gas affairs and a very sound judgment. Moreover, he was a man whose character they all greatly respected; and, indeed, he thought he might say his colleagues all loved him. However, he lived to a good old age—to his 83rd year—and he continued in office until his last illness. The Company had lost a friend. But Mr. Linging had been called away full of years and honours; and he (the Chairman) did not think anyone could feel, in one sense, a regret that a man who had done his life work as their late friend had done his should have gone to his reward. The other case was also one that he wished to refer to. Mr. Glaisher was an Auditor of the Company for thirteen years; and since 1884, he had been a Director. He still lived His wonderful physical and mental powers had been sustained right up to the tenth decade of life. Mr. Glaisher was 92 years of age last April; but his physical power had so far failed that he was no longer able to leave his home. This being so, he had retired from his position as a Director. Their friend was a Fellow of the Royal Society; and a man of very great ability—especially mathematical; and beyond that he was a man possessed of great business capacity. In him they had lost a most valuable colleague; and their sympathy went out to him on his sick bed at the present time. He (the Chairman) was sorry to say Mr. Glaisher had been laid up for some months now. While on this subject of Directors, he might say that the duty of filling up the vacancies on the Board rested with the Directors. It would seem (and he must confess he had often felt so himself) that it would be proper that the duty of selecting Directors should rest with the shareholders. But the shareholders unfortunately could not make a proper selection. They were, so to speak, a body of units; and they could not act unitedly in this respect. It was impossible for them to select the best men. Each shareholder knew that he was a shareholder; but he did not know who else was, and he had no means of knowing the fitness of other shareholders for the position of Directors. Thus the Board had to perform the task to the best of their ability. The Directors he might say took a great deal of pains over this matter; and the selection on this occasion, as on other occasions, had not been hastily made. Mr. Linging placed his resignation in his (the Chairman's) hands some months before he died, and so did Mr. Glaisher before he finally retired. But there was no need to be in a great hurry to accept the resignations; and so the Directors occupied themselves in the meantime in looking out for suitable men. The Directors picked out the shareholders who had the full qualification at the time for directorships—viz., £2000 of stock. They went over the list several times. Some were ineligible for one reason, and some for another. Some whom the Directors thought were most eligible were applied to, to accept a seat on the Board. They said they were too busy, or else advanced other reasons why they could not give their services to the Company. At last, the Board found among the shareholders two gentlemen who they felt would make most suitable colleagues. The Directors, in accordance with their duty, and with a due sense of the responsibility resting upon them, ascertained that Mr. Jabez Light, for many years Goods Manager of the South-Eastern Railway and a Director of the Metropolitan Railway, was willing to serve; and so they elected him. They also found that Mr. Bryan Donkin, the head of a well-known firm of mechanical engineers, and a man unequalled (he thought he might say) in certain branches of science connected with gas—such as the value of fuels, of steam engines and boilers, and of gas-engines. In all these matters, his knowledge was unrivalled. The Directors felt themselves very fortunate in getting these two gentlemen to come on the Board. Consequently, they had elected them; and they believed the Company would derive great benefit from their services. Proceeding to the accounts, he did not think it was necessary to trouble the proprietors very much with the figures—in fact, it was not much use making comparisons, because the elements differed so greatly. For instance, coal had fluctuated enormously during the last two or three years; but it was now going down. It was a rather singular thing that coal made this great rise about March, 1900; and the great drop took place in March, 1901. There was an advance of about 8s. per ton in the f.o.b. price of coal during those twelve months. On looking at the two half years, it was a most extraordinary thing that coal cost the Company, for the June half of 1900, 17s. 3·8d. per ton; and it cost exactly the same price for the June half of 1901. In the first half year (1900), it was rising; in the second half year (1901), it was falling rapidly. So the Directors were able to take advantage of the drop. Their contracts expired, if anything, rather before March last; and the Directors were thus able to make their contracts at the full reduction of about 6s. or 7s. per ton for twelve months from March. Consequently, for the latter three or four months of last half year, they were getting cheaper coal. But there was another side to the story. Though coal was cheaper, coke had gone down quite as fast; and he was afraid it had fallen still further since the accounts were made up. But the net result at any rate was, that whereas in June, 1900, they had a profit of £20,814 on the revenue account, in June, 1901, they had a profit of £21,159, or £345 more. In the December half year, their profit was only £13,700; and it was some thousands of pounds short of the amount necessary to pay the dividend. Well, now they found themselves in a far different position. They had placed £500 to the workmen's superannuation fund. Nearly twenty years ago, a superannuation fund was started for the workmen; but for a number of years, the Company did not contribute to it so much as they ought to have done. The men contributed 3d. per week; and the Company ought to have contributed an equal amount. But they did not. Consequently, the fund had been in rather low water; and they were now endeavouring to make it up. Last year—in the two half years—they placed £1000 to the credit of the fund. In the past half year, they had placed £500 to its credit; otherwise the surplus would have been £500 more. But he was sure the shareholders would not complain of an act of this sort, particularly when he was able to say, as he should do before the meeting ended, some good words on behalf of the workmen. Dealing next with the paragraph in the report relating to the sale of gas, he said that, when they raised the price of gas, the increase in consumption (which had been at the considerable figure of 11 per cent. in the half year to June, 1900) immediately dropped to almost nothing; and in the half year under review, instead of an increase, they had a decrease. The decrease was not much; it was less than 3 million cubic feet on 600 millions. But it was a decrease, notwithstanding, of nearly ½ per cent. However, a satisfactory thing was that, immediately on the announcement of a reduction in price from 2s. 10d. to 2s. 7d. from Midsummer, the normal increase returned; and in the month of July, they had an increase of about 8 per cent. He did not think that there was much more to say. They were in a thoroughly prosperous condition; and when a company could say that—well, there was nothing to excuse and nothing to explain. But he should like to say a word or two about the employees. They were working under what was known as the profit-sharing system. It was really an extension of the sliding-scale; and there was something he ought to specially explain in connection with it. As the proprietors were aware, for every reduction the Company could make in the price of gas, they were allowed an increased dividend; and the application of the system to the workmen was carried out in this way: For every 1d. reduction they were able to effect in the price of gas, they allowed their employees 1 per cent. on their salaries or wages—both the officers and the workmen participating. Last June twelvemonth, the amount distributed was equal to 6 per cent. on the salaries and wages—half of the amount being invested in stock, and the other half withdrawable at a week's notice. He was happy to say the larger part of the men left their withdrawable money in the Company's hands, on deposit, to accumulate; and the amount invested in stock was, of course, permanently invested. He believed the figures were now something like £13,000 value of stock, and £4000 on deposit. But the special feature to which he wished to draw attention was the fact that, whereas the bonus in June, 1900, was 6 per cent., when they raised the price of gas the shareholders' dividend went down, the consumers had to pay more for their gas, and the employees had to take a smaller bonus—instead of 6 per cent., they only got 2 per cent. this last June; and whereas for the year ending June, 1900, they received £2068, for the last year they only got £795, or considerably less than half. Besides, a larger number of men were participating; otherwise it would only have been one-third. Now how had the workmen taken this? Most people would say: "This profit-sharing is all very well so long as you are increasing the bonus; but when you come to reduce it, what then? Then you will have grumbling and discontent." Now he wanted to emphasize this: There had not been one word of discontent. The men had taken their loss of bonus (and it was a much larger proportion of loss than in the dividend) just as gracefully as the proprietors had accepted the loss of their dividend. They felt with the proprietors that, as they had shared in the good times, they must also help to bear the brunt of the bad ones; indeed, the feeling manifested by the workmen was such that nothing could be better. Only last week a meeting of them was called for the purpose of proposing the establishment of an accident fund. He might tell the proprietors that he had addressed a great many meetings in his time, and among the pleasantest he had addressed were those of the shareholders of this Company and the South Metropolitan Company. But there was one class of meeting the addressing of which was even more pleasant than those; and that was a meeting of the workmen of either of the Companies. Nothing had ever given him any greater delight than in addressing their workmen. The manner in which they listened, the way they received what was said, the strong feeling of sympathy that one felt they bore towards the speaker, were of the most gratifying character. This, he held, was one of the results of the profit-sharing system. Now, as to the dividend. The dividend proposed was at the rate of 5 per cent. The proprietors had been in the habit of receiving 5¼ per cent.; but the Directors were now proposing to pay the full dividend the proprietors were entitled to by their Act of Parliament. When the price was 2s. 10d. per 1000 cubic feet, they could only pay 5 per cent. At 2s. 7d., they could pay 5⅜ per cent. For every penny reduction at which gas was sold below 2s. 10d., they might increase the dividend 2s. 6d. per cent. Therefore at 2s. 7d., the addition would be three two-and-sixpences, or £5 7s. 6d. He mentioned this to explain how the matter stood. But the proprietors must not expect that the Directors would pay £5 7s. 6d. next time, though it was quite possible, if they had a good half year, they might revert to the 5¼ per cent. which they had previous to the great rise in the price of coal.

Dr. FREDERIC HETLEY seconded the motion, which was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. C. LEA WILSON, a dividend at the rate of 5 per cent. per annum on the preference and ordinary stock, less income-tax, was declared. The last-named gentleman referred to the extensions at the works—alluding

particularly to the new retort-house, which he said was working in a manner that no other company could equal. For this, they had to thank their Engineer (Mr. S. Y. Shoubridge).

Mr. H. E. JONES said he did not think his fellow-shareholders would like to separate without paying the usual compliment to the Chairman and Directors. As an expert, he might say the Company's accounts filled him with amazement. That they could get a larger profit this June than was got twelve months ago was nothing less than a unique experience. He only knew of one other Company that had done this, and that was the South Metropolitan Gas Company. Really, it perfectly staggered him. He had seen a great many gas companies' accounts; and he could assure the proprietors that the average result was many thousands of pounds to the bad. This Company's results showed how well the Directors and the officers looked after the business. On behalf of the shareholders, he thought he might say how extremely gratified they were at the selection of Directors made by the Board.

Mr. SAMUEL WHILE seconded the motion; and it was unanimously agreed to.

The CHAIRMAN sincerely thanked the proprietors for their kind expressions of good-feeling towards the Board. He then spoke of the devotedness of Mr. Shoubridge and Mr. Ohren and their respective staffs to the interests of the Company. The foreman and workmen, he also remarked, were equally devoted—in fact, they were a happy family, all working for the good of the concern. He had therefore much pleasure in moving a vote of thanks to them.

Mr. JABEZ LIGHT seconded the motion, which was cordially agreed to.

Suitable replies having been made by Mr. Shoubridge and Mr. Ohren, the proceedings terminated.

CROYDON COMMERCIAL GAS AND COKE COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Friday, at the Offices, Katharine Street, Croydon—Mr. CHARLES HUSSEY, J.P., in the chair.

The SECRETARY (Mr. W. J. Russell) having read the notice convening the meeting, the reports and accounts, of which an epitome appeared last week, were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said he was sorry he could not propose the resolution as cheerfully as he had done on a great many occasions, because this time he had not as good a balance-sheet to place before the proprietors. But they had not far to look for the reason; and he thought when he had given the proprietors a few figures, they would be satisfied that it was not due to any mismanagement, but was simply and solely due to causes over which the Directors had no control. The increase in the consumption of gas was 5·15 per cent., which he thought, taking into consideration the mild winter and bright spring, must be regarded as very satisfactory. He had made a comparison with several other companies; and their own Company occupied a very fair position in respect of the increase in consumption. The growth in the number of consumers must also be considered highly satisfactory. During the half year, they had an increase of 192 in the number of their ordinary consumers, and of 489 in the prepayment and automatic consumers—making the total number of consumers on the books 16,682. Additional gas-stoves had also been supplied to the number of 669; making a total of 8424. To show that they were still increasing, and at a greater ratio than during the past six months, he might mention that the last monthly report of their Engineer (Mr. J. W. Helps) stated that a further 284 meters had been fixed, and 310 stoves; so that the business was still increasing very rapidly. The report referred to the sum (£5556) that it was necessary to take from the reserve fund in order to pay the dividend. They had not earned the dividend in the six months; but the reserve fund was created for the very purpose of equalizing dividends in such times as had been experienced during the past twelve months. It had been a very trying period for the Directors; and he was sure the proprietors would agree that it was the right thing to do to take the amount required from the reserve fund. He did not think the consumers could complain of this. For many years the Company had not paid dividends up to the hilt, as they could have done, and were entitled to do, under the sliding-scale; and moreover, unlike many other companies, the Directors had not, on the increase in the cost of coal, raised the price of gas to any great extent. Dealing with the accounts in more detail, he said that, during the six months, they had spent on capital account £7497. The expenditure on new buildings and manufacturing plant had been £1886. On new mains and service-pipes, £2014 had been spent; and to show that Croydon was still developing, he mentioned that gas-mains had been laid in 28 new roads. Additional meters (681) had cost £402; additional stoves (669) £2715; and additional fittings £479. Turning to the revenue account, he said they had received from private consumers in the Croydon and Carshalton districts, and from public lighting, a total of £59,588, which was an increase of £6115 on the corresponding half of 1900. This was fairly satisfactory; and had it not been for the increase in the price of coal, they would have had a good half year indeed. The rental of meters had returned £139 more; and stoves £307 more. Coke had realized £12,902, or £1401 less; but the price was 0·43d. per cwt. better. Breeze had produced £281 less, and tar £177 more. A little better price was obtained for tar, and, of course, an additional quantity had been made. Sulphate of ammonia had depreciated very much in price. The sales had been £317 less; and the price was lower by £1 9s. 6d. per ton. The total receipts from all sources amounted to £80,459; being £4775 more. Regarding the expenditure side of the account, coal and oil had cost £43,224, or an increase of £16,201. This at once explained the reason that had led to the taking out of the reserve fund of an amount to make up the sum required for the dividend. The average price of coal was 8s. 4d. per ton more than they were giving in the corresponding half of 1900; and, as everyone knew, on the large quantity of raw material the Company consumed, this was an enormous sum. As the proprietors were aware, the Directors only increased the price of gas by 2d. per 1000 cubic feet; whereas many other companies advanced from 3d. up to 7d. The Directors thought the 2d. would go a long way towards making up the loss they were sustaining; but in this they were somewhat disappointed. During the first three months of the nine months that coal had cost them the higher price, they were selling gas at the same price—viz., 2s. 8d. Supposing they had been selling gas at an increase of 4d. (which would have been a very fair price to have charged), that would have given them not only sufficient to pay the dividend, but there would actually have been a surplus of £1700. Now 8s. 4d. per ton on the cost of coal was equal to 57 per cent.; and they only charged an extra 2d. on the price of gas, which was merely equal to 6·25 per cent. increase. Therefore he thought this should be satisfactory to the consumers, although the Company got very much scathed about it at the time for putting on the 2d. If they had put the price up 4d., they would not have had any more grumbling than they had done over the 2d. However, they did not regret the fact that they did not increase the price above the 2d., because they had, at any rate, shown the public that the Company did study their interests. Another reason for their loss was that, unfortunately, they had to make their contracts for twelve months; but the proprietors would be pleased to hear that, with regard to coal, they had been able to make contracts which had brought them very near the old prices, and they had been enabled to get oil for the carburetted water-gas plant at a very much more reasonable price—in fact, only a trifle over the old figure. Now these contracts, the Directors hoped, would permit them to go on in the prosperous manner they had done, and to present to the proprietors a different balance-sheet from what they had given them on this occasion. They believed they would be able to do this, if not at the next meeting at the following one. After some remarks as to the general depression in trade that had been hanging over the country, he moved the adoption of the report and accounts.

Mr. THOMAS RIGBY seconded the motion, which was unanimously carried.

Mr. SAMUEL SPENCER moved the declaration of a dividend at the rate per annum of 14 per cent. on £51,600 consolidated "A" ordinary stock, of 11 per cent. on £178,400 "B" stock, 9 per cent. on £25,000 "C" stock, and 9 per cent. on £20,000 Carshalton capital, all free of income-tax. In a few remarks, he spoke of the fact that the interests of the consumers had been studied by only raising the price of gas by 2d.; and he ventured to think that the £5556 which it was necessary to draw from the reserve fund would, in a short time, be replaced.

Mr. WILLIAM CASH, F.C.A., seconded the motion. He observed that he and his colleagues were perfectly convinced they did the right thing to only increase the price by 2d. The increase in the sale of gas tended as a matter of course to a reduction in price; and the fact that, after putting up the price 2d., they were able to record an increase of 5·15 per cent., while a great many other companies were recording decreases, showed that they did the right thing.

The motion was unanimously carried.

On the proposition of Mr. BAYNES, seconded by Mr. DYETT, a hearty vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN briefly acknowledged the compliment, and then proposed, in cordial terms, a vote of thanks to the officers, staff, and workmen, for their efficient services during the half year.

Dr. T. RUTHERFORD ADAMS seconded the motion, which was also unanimously passed.

Mr. RUSSELL, in responding, referred to the loss of one of his Assistants, Mr. R. J. Hartley, who had served under him for 34 years. Mr. Hartley always had the interests of the Company at heart; and he (Mr. Russell) regretted his loss very much. Mr. Helps and himself had thought it their duty to raise some memorial to the memory of their old colleague; and it was with much gratification that he had received the sum of 5 guineas towards this object from the men at the works.

Mr. HELPS replied on behalf of himself and his staff and workmen; and he took the opportunity of saying how much he and his wife appreciated the resolution that was forwarded to him after the last meeting in connection with the illness of his wife. He regretted that the good wishes of the proprietors had not relieved his mind entirely from the anxiety he then suffered.

Introduced by the CHAIRMAN, on behalf of the Directors, a resolution was unanimously passed that the sum of 200 guineas be voted to Mrs. Susan Hartley in recognition of the services rendered to the Company by her late husband.

An Extraordinary General Meeting was then held for the purpose of empowering the Directors to raise additional stock and loan capital.

The CHAIRMAN moved a resolution to the effect that the Directors be authorized to raise additional capital to the amount of £62,500, being the balance authorized by the Company's Acts, by the creation and issue of consolidated "C" stock to the amount of £50,000, and by the issue of debenture stock or mortgage debentures and loan to the amount of £12,500, in such amounts, manner, and times as the Directors may from time to time determine. He remarked that the last time the Directors asked the proprietors for power to issue capital, it was for £30,000 of ordinary shares and £7500 of mortgage debentures. This was in 1892; so that he did not think the proprietors could accuse the Directors of having been extravagant. It would, however, be seen from the balance-sheet that they had overspent the powers given them nine years ago by £19,000. This had been because they had been able to borrow money on very reasonable terms from their bankers, and at a much less price than it would have cost them if the Directors had issued new stock. He thought the proprietors would say they had been good financiers in this respect.

Dr. THOMPSON seconded the motion, which, after a short discussion, was unanimously carried.

The somewhat protracted proceedings then terminated.

The Local Government Board have sanctioned a further loan of £5500 for the erection of a gasholder and other plant at the Driffield Gas-Works. The District Council asked that the repayment of the loan should extend over forty years; but the Board have decided that it shall be repaid in thirty years.

SHEFFIELD UNITED GASLIGHT COMPANY.

Half-Yearly Report and Accounts.

In the report which the Directors of the above-named Company will present at the half-yearly general meeting on the 10th prox., they state that the Company's business continues to expand; the increase in the quantity of gas sold during the six months ending the 30th of June having been 57,609,000 cubic feet, or 4·44 per cent. Owing, however, to the inflated price of coal, the profit earned is insufficient to pay the dividend, which requires £43,424. The sum of £15,639 will therefore have to be taken from the balances carried forward from previous years. The accounts accompanying the report show that the sale of gas for public and private lighting produced a revenue of £138,859; meter and stove rents, £7041; and residuals, £60,373—the total receipts being £207,154. The following are the principal items of expenditure: Coals, £99,006; carbonizing wages £18,892; repair and maintenance of works and plant, £26,902; distribution, £13,322; rents, rates, and taxes, £10,453; and management, £5840. The total expenses for the half year were £180,221; so that the balance carried to profit and loss account is £26,933. New coal contracts having been concluded on more favourable terms than before, the Directors intend to reduce the price of gas by 2d. per 1000 cubic feet from the date of reading the meters next month.

BRISTOL GAS COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held on Thursday, at the Offices, Canons' Marsh, Bristol—Alderman J. W. S. Dix in the chair

The Secretary (Mr. J. Phillips) having read the notice of meeting, the report and accounts for the six months ending the 30th of June, noticed last week, were presented.

The Chairman, in moving the adoption of the report and accounts, said he need not tell the proprietors that the last twelve months had been a most anxious and trying time for the Board, in consequence of the great rise in the price of coal; and they had had considerable difficulty in carrying on their work. He, however, was pleased to say—and he thought it was a matter of congratulation to the Directors as well as it was to the consumers—that they had been able to pull through without having to increase the price of gas. He believed nearly every gas company in the country had been obliged to raise their charge for gas, some as much as 6d. per 1000 cubic feet. The contracts for coal were different now from what they were twelve months ago; and he hoped by careful attention to the interests of the Company, on the part of the Directors, they would go through without advancing the charge for gas. There was one matter to which he wished again to refer, and that was that the Directors were anxious to impress upon all persons who wanted to hire cookers from the Company to come early and give their orders, as the demand was so large that they could scarcely keep up the supply. In December, 1898, they had 7155 cookers on hire; in 1899, 9905—an increase of 2750; and in 1900, 13,095—an increase of 3190 on the year. In June, 1901, they had 15,173—showing an increase of 2078 for the half year; while in August there were 15,749 cookers in use, or an increase of 576 in six weeks. These figures afforded proof that the Directors had to be on the alert to carry out the orders. With regard to prepayment gas-meters, these now numbered 5113. The length of mains was 327 miles, and they had laid about five miles in the past six months. The quantity of gas they had sold had been 10,090,854,000 cubic feet—an increase of 63,412,000 cubic feet, or 6·17 per cent. during the half year; while from the 1st of July up to the present it was about 8½ per cent. All this was a sign of the Company's prosperity. Their Engineer, Mr. Fiddes, had retired, and they had appointed in his place Mr. Irving, who had been with them for some years.

Mr. Stothert seconded the motion, which was carried.

A dividend of 5 per cent. was then declared; and a vote of thanks to the Chairman brought the proceedings to a close.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The annual general meeting of the Bridport Gas Company will be held to-day, when the Directors will report that the profit on the year's working, with the balance brought forward, amounts to £1387, which will enable them to recommend the payment of a dividend of 8 per cent. on the ordinary shares, free of income-tax, and of 5 per cent. on the preference shares, less tax. This will absorb £975, and leave £412 to be carried forward. There was an increase of 1,014,900 cubic feet in the consumption of gas in the year ending June 30. The total revenue was £4946; the expenditure, £3994—leaving a profit balance of £952.

At the 129th half-yearly general meeting of the Cardiff Gas Company, held a few days ago, under the presidency of Mr. C. H. Williams, the Chairman, in moving the adoption of the Directors' report, dwelt upon the important question of coal supply. Finding local prices prohibitive, the Board had, he said, been compelled to make contracts at a considerable distance, in order to secure some reduction from the top prices paid the previous year. A considerable quantity of this coal was still in hand. The Directors, however, after a great deal of trouble, had succeeded in getting something back; and his colleagues and himself were quite unanimous in giving their consumers the whole of the advantage thus obtained, which enabled them to announce that the price of gas would be reduced to all private consumers from the 29th of September by 3d. per 1000 cubic feet—thus bringing down the amount of the increased charge by 50 per cent. Dr. Taylor seconded the motion, and it was adopted. The usual dividends were then declared. Votes of thanks to Mr. H. Morley (Engineer) and Mr. George Clarry (Secretary), and also to the Chairman and Directors, for their indefatigable services, were unanimously passed.

The revenue account of the Falmouth Gas Company for the year ending the 30th of June shows that from the sale of gas the Company received £6859, and from the rental of meters and cookers, £363; while residual products realized £1124. The total revenue amounted to £8457; the expenditure, to £6841, in which is included £3982 for coal, oil, &c. The profit on the year's working is £1616. An interim dividend of 5 per cent. for the half year ending the 30th of December was paid; and the Directors recommend payment of the balance of the statutory dividend of 5 per cent.

The annual report of the Hartlepool Gas and Water Company shows that the balance of revenue account is £26,060. The Directors recommend a dividend for the half year at the rate of 5 per cent. per annum on the whole of the paid-up capital, less income-tax. The lessened divisible revenue is largely due to the heavy parliamentary costs, and to the high price of coal. The consumption of gas and water is satisfactory; both showing an increase.

The past half-year's report of the Heckmondwike Gas Company shows a profit of £1785. The maximum dividends are recommended on all the shares; leaving a balance of £3085, against £5242.

The half-yearly accounts of the Littleborough Gas Company reveal an available balance of £3161; and the Directors are enabled to pay the usual dividend at the rate of 10 per cent. per annum.

The half-yearly general meeting of the Maidstone Gas Company was held on Thursday—Mr. G. Marsham in the chair. The report showed a balance of £13,791 in the Company's favour; and the Directors recommended the declaration of a dividend, less income-tax, for the year ended the 30th of June, at the rate of 9½ per cent. per annum, of which 4¾ per cent. would be payable on the 1st prox., the other portion having been paid as an interim dividend on the 1st of March. The Directors reported that the works and plant (under the supervision of Mr. H. Smythe, the Company's Engineer and Manager) were being maintained in good condition. In moving the adoption of the report, the Chairman said there had been an increase in the consumption of gas during the past year to the extent of 3·56 per cent. compared with the year 1899-1900. The additional number of ordinary consumers was 53, and of prepayment consumers 119; and there had been 149 additional gas stoves. The matter that perhaps attracted their attention more seriously than anything else was the electric light, which was about to be used in the town. It was not his wish, nor that of his brother Directors, that they should be in any way antagonistic to the light, beyond this, that they must consider the interests of the shareholders. One advantage of gas over electric light was that in the manufacture of gas they had so many residuals, from which they obtained a very large amount of income. Having quoted figures in support of this statement, he cited others showing the cheapness of gas in comparison with the electric light, both for lighting and for motive power. He told a story of a friend who was recently staying at a hotel in a large town in England, in the reading-room of which there was gas as well as the electric light. His friend observed that everybody who wanted to read did so by the gas light; and he thought this was a very strong argument in its favour. Mr. W. Bryant seconded the motion, and it was carried. The dividend recommended having been declared, Mr. G. F. Baker, in proposing the re-election of the three retiring Directors, endorsed what the Chairman had said with regard to the advantages of gas over electricity, and stated that he had had his shop fitted throughout with Welsbach incandescent burners, at a great saving to himself in the consumption of gas, and with markedly beneficial results as regards light.

The report of the Directors of the Mirfield Gas Company for the half-year ended June 30 shows a profit of £2150; making the amount available for dividends £4073. They recommend the payment of the full dividends at the rates of 10 and 7 per cent. These payments will absorb £2500, and permit of £1473 being carried to next half-year's account. The sale of lighting gas produced £3897, through coin meters £1009, and heating gas £842—total £5708.

At the half-yearly meeting of the Pontefract Gas Company, dividends of 10 per cent. on the original shares and of 7 per cent. on the new ordinary shares were declared. The Chairman (Mr. J. Taylor) explained that, owing to the increased cost of coal—16s. 4d. per ton instead of 12s. 7d.—the Company had not actually earned the amount necessary to pay these dividends. There had been a considerable shrinkage in the amount of gas consumed, owing principally to the increase in the price; but they were not anxious to enlarge the output until the completion of the new works now in hand. They would then be prepared to supply slot meters in new property. He remarked that contracts for coal had now been entered into at the old rates.

The half-yearly general meeting of the Portsea Island Gas Company will be held next Saturday, when the Directors will present accounts showing a balance of £37,521, which will enable them to recommend the payment of dividends at the rate of 13 per cent. per annum on the "A" and "B" shares, of 12 per cent. per annum on the "C" shares, and of 5 per cent. per annum on the stock (less income tax), and to place a further sum of £2000 to the insurance fund; leaving a balance of £25,329 to be carried forward. In the six months ending June 30, the Company had a revenue of £79,107, compared with £71,700 in the first half of 1900; while the expenditure was £63,823, against £58,914. The amount carried to the profit and loss account is £15,284; whereas this time last year it was £12,786. The quantity of gas made in the six months was 475,318,000 cubic feet, of which 447,131,200 cubic feet were sold and 452,356,400 cubic feet accounted for.

The balance-sheet submitted at the recent meeting of the Rochester, Chatham, and Strood Gas Company showed that the total receipts for the past half year amounted to £40,623, including £29,633 from the sale of gas. The expenditure totalled to £38,674, leaving a balance of £1949. The Directors regretted that, owing to the continued effects of the greatly increased price of coal, the statement of accounts for the half year ended June 29 last was not of such a satisfactory nature as they had reason to expect; but the balance to the credit of the revenue account, with an addition from the undivided profits of previous years, was sufficient to pay the statutory dividends of 10 and 7 per cent.

At the half-yearly meeting of the Wakefield Gas Company, on the 12th inst., the Directors presented a very gratifying report. The revenue account showed a balance of profit of £5660, which was sufficient to pay the usual dividend after £500 had been set aside for

the reduction of the suspense account. Though 900 tons less coal was used in the six months ending June 30, the sale of gas advanced by 250,000 cubic feet on the abnormally heavy increase in consumption of 8 per cent. in the corresponding period of last year. The coke employed in heating the retorts amounted to 976 tons, against 1899 tons in the first half of 1900—a saving of nearly 50 per cent. in the fuel account; while the carbonizing wages have fallen from £1772 to £1067. These excellent results were achieved by the adoption of inclined retorts, which were in operation the whole of the half year. The leakage was reduced by 2,207,000 cubic feet; bringing down the percentage from 6·9 to 5·3, which was considered very good for a mining district. The Vice-Chairman (Mr. R. E. Goldthorpe), in the absence of Dr. Statter through indisposition, moved the adoption of the report. He remarked that the Corporation were busy erecting electric arc lamps in all the main streets of the city, and the Electric Lighting Committee proposed to instruct the Electrical Engineer to prepare a scheme and estimate for the extension of electric street lighting for submission to the Street Lighting Committee. This was undoubtedly a step to be regretted, as electric arc lighting had been tried and condemned by several of the leading cities of the world. The Corporation had lately lighted Southgate by means of incandescent electric lamps. It was a well-known fact that as much light could be obtained for 1d. from incandescent gas-burners as for 10d. from incandescent electric lamps. Having regard to the alarming manner in which the rates had recently gone up, and as one of the largest ratepayers in the city, the Company strongly protested against this expenditure of the ratepayers' money. The report was adopted, and the usual dividends at the rates of 11½, 9, and 8½ per cent. per annum were declared. The retiring Directors (Dr. Statter, J.P., and Mr. W. L. Williams) were re-elected, as was also the retiring Auditor (Mr. W. H. Hughes). A hearty vote of thanks was accorded to the Vice-Chairman for presiding, as well as to the Directors for their attention to the business of the Company. The usual vote of thanks was proposed to the Engineer (Mr. H. Townsend), the Secretary (Mr. W. H. Parker), and the staff.

The revenue of the Weymouth Consumers' Gas Company for the half year ending June 30 amounted to £9555; the expenditure, to £7386—leaving a balance of £2169 to go to the net revenue account. The balance of net profit is £3903, which is £80 less than is required to pay the interest charges upon the loan capital and the maximum dividend on the ordinary stock. That the latter has been so nearly earned, despite the heavy increased cost of coal, and without any advance in the price of gas to compensate for it, the Directors look upon as a matter for congratulation. The business of the Company is developing steadily, and a satisfactory addition has been made to the number of consumers; while the cooking-stoves sent out were more than in any previous year. As compared with the corresponding half of 1900, the increase in the sale of gas during the past six months was at the rate of a little over 9 per cent. At the meeting on Thursday, the Directors will recommend the payment of a dividend at the rate of 5 per cent. per annum (less income-tax); the amount required, in addition to the profit, to meet this to be taken from the balance at the credit of the net revenue account.

It was reported at the meeting of the Yeadon and Guiseley Gas Company last Wednesday, that the average price of coal during the past half year had been 17s. 8¾d. per ton—an increase of 4s. 5¾d. per ton upon the sum paid a year ago. The Directors stated, however, that they had contracted for next year's supply at rather more than 3s. per ton less; and on this account they had decided to reduce the price of gas 1d. per 1000 cubic feet from July 1. The report was adopted; and the maximum dividends of 10 and 7 per cent. per annum were declared. The accounts were noticed last week.

Water Companies.

The half-yearly report adopted by the shareholders of the Brompton, Chatham, and District Water Company discloses a substantial increase of revenue on the corresponding period of last year; the total being £10,795. The maximum dividends of 10 and 7 per cent. have been declared.

The Directors of the East Worcestershire Water Company reported that during the past half year 105 additional services were laid on; making the total 5679, exclusive of Droitwich and Rednal. The average daily consumption of water for these supplies was 839,000 gallons. Since the last report the second borehole at the new pumping-station has been completed, the new engine and two boilers with pumping plant have been fixed, and the engine-house completed. The yield of water has been abundant. The temporary engine at the first borehole will be replaced shortly by a permanent one, capable of increasing the pressure on the higher ground near Bromsgrove. These arrangements have enabled the Directors to give the surplus water from No. 2 borehole as an auxiliary supply to the Birmingham Water Department, pending the completion of the Welsh water scheme; and they trust the arrangement will prove mutually advantageous. Looking forward to the future, an agreement has been entered into for leasing a site on high ground, at Chadwick, for a reservoir. The increase in the capital expenditure for new works and extensions of mains has been £5307, and for additional buildings £941. As to the accounts, the profit amounts to £1976, which, with £1415 brought forward from last account, makes a disposable balance of £3392, which it is proposed to appropriate as follows: To pay a dividend at the rate of 4 per cent. per annum, £1332; to add to the depreciation reserve fund, £1200; and to carry forward the balance of £860.

There was one particularly interesting point in the speech of the Chairman (Mr. H. W. Tyrwhitt Drake) at the meeting of the Maidstone Water Company, when moving the adoption of the report noticed last week. Quoting from reports by Dr. G. Sims Woodhead and Mr. Gregory, he said the first-named gentleman wrote that he was thoroughly satisfied with the way in which the springs had been protected, and with the admirable arrangements that had been made to keep the water supply pure. He was unable to offer any suggestion for improvement. Bacteriological examination showed the water to be excellent. Mr. Gregory said that his chemical analysis of the water proved it to be of uniform excellence. All the sources of supply had presented great, if not greater, freedom from organic impurities than at any period since the analyses were commenced. The Borstal supply exhibited great improvement in appearance, though its organic purity had never left anything to be desired. The Chairman also alluded to a wish of the Directors to increase the reserve fund.

At the half-yearly meeting of the South Hants Water Company, the report presented by the Directors, covering the period to the 30th of June, set forth that the rent-roll had increased by £514 4s. 8d., and that 419 additional houses had been supplied with water. The profit and loss account showed an approximate available balance of £4565. The Directors proposed to pay an increased interim dividend for the six months, at the rate of 7½ per cent. per annum on the 10 per cent. maximum, at the rate of 5¼ per cent. per annum on the 7 per cent. maximum, and at the rate of 3¾ per cent. per annum on the 5 per cent. maximum ordinary shares. The Chairman, in moving the adoption of the report, said the Company continued to show steady progress, and during the recent dry weather they had been in a position to afford a good and constant supply of water to their consumers. The report was adopted, and the dividends recommended were declared.

The Sutton Water Company had a gross revenue of £9421 for the half year, including £781 brought forward. The net profit, after paying interest on debenture stock, was £4012, or £600 more than in the corresponding period of last year. The maximum dividend of 10 per cent. has been declared on the original stock, and £1012 is to be carried forward.

At the half-yearly meeting of the Woking Water and Gas Company next Tuesday, the Directors will report a balance of £2895 on the profit and loss account, out of which they will recommend the payment of a dividend at the rate of 4½ per cent. per annum, less income-tax, which will absorb £2203; leaving £692 to be carried forward. The Engineers (Messrs. Joseph Quick and Son) report that satisfactory progress has been made with the construction of the new works for obtaining a supply of water from the River Thames at Laleham, and that a considerable portion of the trunk main thence has already been laid towards the Company's district. They also report that the engines, boilers, works, and mains are all in good order.

The Directors' report and the statements made at the annual meeting of the Wrexham Water Company show that the Directors have been improving the works. New filter-beds at Pack Saddle have been finished, and are in successful operation. Further deep boring at Talwrn is being advanced as rapidly as possible. In pursuance of the policy of taking every step to safeguard the purity of the sources of supply, the Directors have purchased the only farm remaining above the Cae Llwyd reservoir; and the entire control of the cultivated land adjacent to the stream is now vested in the Company. Expenditure upon capital account, amounting to £3405, has been incurred in connection with the works mentioned, and in the purchase of the farm. During the half year, there has been a slight increase in the receipts, and the number of houses supplied has risen to 5558. A dividend at the rate of 7 per cent. per annum has been declared upon the preference stock, and £4 18s. upon the ordinary shares.

SHIREBROOK AND DISTRICT GAS SUPPLY.

After a delay of several months, necessitated by the settlement of a number of preliminary arrangements, the Directors of the Shirebrook and District Gas Company have placed all the contracts for the erection and equipment of the works and plant for the supply of the town and district, and considerable progress has been made with portions of the work. The delay has been rather advantageous to the Company than otherwise; as, owing to the fall in the prices of iron and steel during the early part of the year, contracts were arranged upon more favourable terms than would have been obtainable at an earlier date. Contracts have been entered into with the following firms: The Staveley Coal and Iron Company, Limited, for pipes; Messrs. Newton, Chambers, and Co., Limited, for the gasholder; Messrs. C. & W. Walker, Limited, for purifiers; the Leeds Fire-Clay Company, Limited, for retort-benches; and Mr. J. Greenwood, of Mansfield, for the retort-house and other buildings. Mr. Joseph Reeds, of Matlock Bath, has consented to take the position of Managing-Director of the Company; and the Board have secured the services of Mr. F. H. Wood, late of the High Wycombe Gas Company, as Manager, and he will superintend the erection of the works and plant. Mr. Arthur Graham, of Mansfield, is retained as the Company's Consulting Engineer. The progress made has been so satisfactory, that the Directors anticipate being in a position to supply gas by the end of the year. In these circumstances, the Secretary of the Company (Mr. A. R. Leivers) has issued a circular inviting intending consumers to give instructions for services to be laid on to their premises. To commence with, gas will be supplied through ordinary meters at prices ranging from 3s. 6d. down to 2s. 9d. per 1000 cubic feet, according to the quarterly consumption; the last-named rate being that charged for gas used for motive power. It is intended to supply prepayment meters free, and 20 cubic feet of gas will be given for 1d. Cooking-stoves will be fixed free and let on hire at a small rental per quarter; gas-fires will be on sale, and purchasers will be able to have them fixed at a moderate charge by competent workmen. A stock of fittings and burners will be kept; and the Company's Manager will always be at hand to give advice as to their selection. It will thus be seen that the Company have made a good bid for business; and there can be little doubt that they will soon reap their reward.

Malmesbury Water Supply.—At the meeting of the Malmesbury Town Council last Tuesday, it was decided to engage Mr. J. W. Restler, Engineer of the Southwark and Vauxhall Water Company, to inspect the works of the Malmesbury Water Company, which the Corporation propose to purchase, with a view to advising the Council as to what expenditure would be necessary in order to put the plant into such a state of repair as would meet the requirements of the Local Government Board. When this amount has been ascertained, the Council will apply to the Board for power to borrow such a sum as will include the purchase-money fixed by the Umpire, Sir John Whittaker Ellis, and the cost of the repairs.

PLYMOUTH GAS COMPANY AND THEIR EMPLOYEES.

Some Pleasant Outings.

Last week the employees of the Plymouth and Stonehouse Gas Company had an enjoyable outing at the expense of the Company. For the convenience of working, the men were divided into three parties. The first went on Tuesday, and numbered, with their wives or sweethearts, about 160. It had been decided by the men themselves that the excursion should be by waggonette to Kingsbridge and Ivybridge. This involved a long drive of some 40 miles, through the beautiful scenery bordering on the South Devon coast; and though the weather was dull and showery, the outing proved most enjoyable. On Tuesday, Mr. J. A. Bellamy, the Chairman of the Company and Mayor of Plymouth, Mr. H. S. Wilcocks, a Director of the Company, and Mr. J. Paton, the Borough Surveyor, accompanied the party, as did also Mr. P. S. Hoyte, the Engineer and Manager, who had general charge of the arrangements, and was also present on each of the following days. On arriving at Kingsbridge, the party found a first-class dinner awaiting them. Mr. Bellamy, speaking at the close of the dinner, gave the men a warm welcome, and reminded them that when the first of these outings took place a year ago, he told them that they were not to regard it as an annual event, though he hoped it might become so. A very cordial feeling had sprung up between the men and the Directors and officials of the Company, and they trusted it would long continue. There never had been a year when the work had been more readily or better done than during the past twelve months. The attendance at the gathering this year would be larger than last year; but he should not rest satisfied until the number of men employed was as large as before the introduction of labour-saving machinery a few years ago. The Directors were only too glad to show that they appreciated work which was heartily done. They all had the same business to look after; and the more prosperous it became, the better for all of them. The population of Plymouth was growing, and the demand for gas was increasing also. They would compete with anything which might be introduced in Plymouth for illuminating purposes; and increasing business should tend to their mutual prosperity. Though he did not pledge the Directors to anything, he had no doubt that they would meet on many more occasions under similar pleasant circumstances. Messrs. W. Walters, Cawse, and Bending, retort-house foreman, foreman of the water-gas plant, and the representative of the distribution department, acknowledged the kindness of the Directors. Mr. Hoyte, who was called upon for a speech, endorsed the Chairman's remarks as to the good feeling existing in all departments of the works, and said the men were realizing that their interests were identical with those of the Company. Mr. Wilcocks and Mr. J. W. Cornish (Cashier) also made brief speeches. Mr. Locke, on behalf of the workmen, congratulated the Chairman on his appointment as Mayor. The formal proceedings terminated with cheers for the Chairman, the Engineer, and others. At Ivybridge, to which the party next drove, tea was served; and the party afterwards drove home.

CORK GAS WORKERS' STRIKE.

The Men's Defence.

Under the chairmanship of Mr. O'Leary, the Vice-President of the Gas Workers' Society, the gas-men of Cork who are "out on strike" have held a meeting for the purpose of repudiating the charge brought against them by the Directors of the Gas Company in their recent statement as to the cause of the strike (*ante*, p. 350).

Mr. O'Leary branded the majority of the Directors' statements as false. The men, he said, were driven to strike; and he asserted that there was no rational man but who would say that the action of the management on the morning of the strike pointed to there being something in contemplation. To say that the men were hatching a strike was wrong. They were honestly inclined, as was demonstrated by the fact that, notwithstanding that it was the dull period of the year, they would not submit to the arbitrary treatment sought to be imposed on them on the morning of the strike, but went out instead of waiting till such a time as the present, when they would have the Company in the hollow of their hand. Now they were determined to fight the battle to the bitter end.

Mr. J. O'Gorman, Secretary of the Society, said he wanted to repudiate as far as he could the statements of the Directors. It was not right to say that William Buckley, the foreman, was not disrespectful to the men; and it could also be proved that Buckley was not a competent foreman. There was never any scamping of work; and some of the men who were out on strike had been 20 and 30 years in the employ of the Company, and a fault could not be found with them. The men thought there should be a limit to every man's work, and the Company replied that coal wheelers always wheeled 100 barrels per man the usual distance. More would not be required; and if the distance was longer, additional help would be given. That was untrue. It was also untrue to say that men were not wrongly dismissed. There were old hands dismissed for the least technical offence. The Directors agreed that any man who took part in the previous dispute should not be victimized; but they wanted to victimize those men now. The old system of giving preference in the retort-house and barrow work would not be adhered to by the Directors, who, when old hands were waiting to get it, put a boy to such work. The Directors had broken their word in this respect. As to the claim of the men that each gang should "order" their own coal, so that they could charge the retorts according to the heats, they felt very sore over the matter, because there were cases when men would get too much coal in the first two draws, and in the last two draws in the morning they would not get enough coal, the consequence of which was that the retorts were frequently only half charged, which was often injurious to the retorts. The view of the men was that the making of the gas should be registered every hour; but it was sought to have more made at night than by day, so that the last draws at night would go to the benefit of the day men. This was unjust, and was due to an unfair distribution of coal. Out of the ten concessions sought by the men, they only satisfactorily secured two. He also declared that the Directors had broken faith with the men by not signing an agreement drawn up between them after the first dispute, in which agreement the Company undertook to do certain things. It was untrue to say that the men gave a guarantee on that occasion that they would not go out; they merely said they would lay their grievances before the Directors. On May 15 last, the Manager's attention was drawn to the retorts in the new house, and to the fact that the men were carbonizing gratuitously 3 cwt. of coal over the amount they were supposed to carbonize; but they were content to do this in consideration of the lighter work in the new house. They were carbonizing 2 tons 13 cwt.; and they were only getting paid for 2 tons 10 cwt. On the day the men left the works, at 3.30 p.m., as they were finishing the last three retorts, the foreman ordered them to put in three scoops of coal, each containing $1\frac{1}{4}$ cwt. The men refused to do so, as it would be violating the contract entered into with them in August, 1900. The usual quantity put in was two scoops and four shovelfuls, or about $2\frac{3}{4}$ cwt. The foreman sent for the Manager, who again ordered the men to charge the retorts with three scoops of coal. He got the same answer as the foreman; and the men were told to clear out. When they refused to carbonize the extra coal, he (Mr. Gorman) was approached by a clerk with a message that Mr. O'Mahony, the Secretary, wanted to see him (Mr. Gorman). He was then in a practically nude condition; and he told the clerk that he was not in a proper state to go to Mr. O'Mahony, who, he said, might go up and talk to the men. He denied that he ever said that, if Mr. O'Mahony wanted to see him, he knew where he could find him. When, however, Mr. Harrington and he did meet, he asked that the men be allowed to resume work until Saturday; and that if they had committed any crime, they would be satisfied to abide by the decision of the Directors. They were then told that Mr. M'Grath's decision could not be altered. The men went out, but it was wrong to say that they intimidated anyone. The others went out voluntarily in sympathy with their comrades, because they knew that what had happened to the few men would happen to the many. He contended that the strike was justifiable on the part of the, men, and the action of the Directors was highly unjustifiable. An offer to take back twenty men was never made to the strikers. Other speeches followed.

Reply by the Directors.

The inaccuracies in the speeches at the above meeting drew a reply from the Directors, through Mr. O'Mahony, in the early part of the past week. He refers to Mr. O'Leary's statement, that the men were deliberately driven to the strike by the management, as a most scandalous charge, and says the Directors absolutely deny it. Mr. O'Gorman's charges against Mr. Buckley are also untrue. He is a young man, but a very competent foreman. The Company, Mr. O'Mahony also states, never required the men to wheel more than 100 barrels of coal per man the usual distance, and no complaint was made since the first strike about this. The Directors maintain that no man was unjustly dismissed at any time; and they have kept their pledge that no man should be victimized for his share in the first strike—the proof of this being that the leaders of the strike were in the Company's employment when the present strike took place. The reference to preference not being given to old hands is also untrue. As to the ordering of their own coal by the men, the Directors refused that on the occasion of the first strike. This and all other points raised by Mr. O'Gorman were brought forward then, and at the settlement the Directors received a letter from Mr. O'Gorman to say the men accepted the arrangements arrived at. Mr. O'Gorman says that the men gave no guarantee not to go out on strike without submitting their complaints to the Directors and waiting their reply. An understanding, however, was undoubtedly arrived at to this effect in the presence of Alderman Cave and Alderman Kelleher; and the Directors see little difference between the words guarantee and understanding in this sense. A full and accurate account of what happened on May 16, the letter says, has been already given to the public in the Press and by pamphlet. Briefly, the men were asked to put in some extra coal, to reduce the excessive temperature in a few retorts—a work which would have taken only a few minutes. Even if this had been extra work, which the Directors deny, it was necessary to save the Company's property from injury. Extra pay would have been granted if the work was shown to have been extra. But this was not demanded; and the men refused to obey reasonable orders. Mr. O'Gorman's statement that he told Mr. Harrington that, if the men were allowed to resume work till Saturday, they would be satisfied to abide by the decision of the Directors, is not true. What he did say was, if the four men were allowed to resume work, the Directors could consider their case afterwards, which is a very different thing. The men seek to convey that they were asked to carbonize more coal than they agreed to do. As a matter of fact, for the first four months this year they were several hundred tons short of the agreed amount.

The Corporation and the Company.

On the minutes of the Public Works Committee there arose, at the last meeting of the Cork Corporation, a discussion with reference to the question of enforcing on the Gas Company the penalty for failure to furnish the quantity and quality of gas agreed to be supplied. The resolution that the penalty should be enforced was moved by Mr. Lane, who was of opinion that this should be done in the interests of the citizens, who, he alleged, were being wronged month after month in this connection. The Company, he added, were continually claiming the indulgence of the public, but were "defrauding" them of the legal quantity of gas. It was pointed out to Mr. Lane that, before the Town Clerk could move, he must be instructed by motion of the Council, and of that motion notice must be given. Alderman Kelleher considered the action of the Council in not enforcing the penalty showed partisanship with the Company as against the men on strike. The gas tester had reported that for three or four weeks the gas was only 8 or 9 candle power, and still no penalty was put on the Company. The gas was not being supplied in accordance with the agreement entered into. The Company were trying to defeat the men; and they should pay the

penalty if not giving the gas they had agreed to supply. Mr. Kinmonth thought the Company ought to do more than they were doing for the inhabitants; and Alderman Cane considered a great injustice was being done to the manufacturers. Mr. Lane afterwards gave notice that he would move, at the next meeting of the Council, that the penalty which the Act of Parliament empowered them to enforce on the Company for failing to supply the light they had undertaken to furnish, be enforced from the date of the first failure to give sufficient light.

Abortive Negotiations.

Writing on the 10th inst., a correspondent of the "Freeman's Journal" says: "The Cork gas workers' strike has now been exactly three months in existence, and those who are in possession of all the facts connected with the present state of affairs are not so optimistic as to hold out any hope that the lapse of another quarter of the year will find the unfortunate dispute at an end. During mid-summer, when the days were long, and there was consequently no extreme necessity for great pressure with regard to public lighting, no very vigorous efforts were made to bring about a settlement—at least, after the first few abortive attempts in this direction; but now that the days are rapidly shortening, and the serious effects of the strike are becoming more keenly felt, strenuous endeavours have been made within the past week to restore the old order of things. It is understood that the negotiations of the past few days, which were instituted by some influential citizens, were of the most friendly character, and gave hope of a satisfactory termination. In fact, such a conciliatory disposition operated on both sides that the only point of difference was the keeping out of a few prominent strikers for the time being; the Directors presumably being anxious that the public should not be impressed with the idea that in any settlement arrived at the men had been conceded all they desired. Between the period of the dwindling of the differences down to the small point referred to and that of conveying to the men the degree to which the negotiations had reached, the strikers evidently got wind of the undoubtedly serious state of affairs at the works. Feeling strengthened by this turn of events, they pressed their claims in the extreme. The Directors will not yield, and thus fuel has been added to a fire which the citizens hoped had touched the vanishing point. The war between employers and employees is now as fierce as it has ever been at any stage. In the meantime, the city suffers more than one cares to imagine."

CARLISLE CORPORATION AND THEIR GAS AND WATER ENGINEER.

A large portion of the meeting of the Carlisle Town Council last Tuesday was occupied with personal matters connected with the Gas and Water Engineer (Mr. C. B. Newton), who, it will be remembered, deemed it advisable, in view of circumstances that have been recorded in our columns, to send in his resignation of his position, which was accepted. As he was a candidate for the appointment of Engineer and Secretary of the Scarborough Gas Company, and had to meet the Directors on the 2nd inst., the Gas and Water Committee gave him a testimonial recording their "appreciation of the excellent work" carried out by him as Gas and Water Engineer during the last six years, "in which he has shown professional ability of a very high order, combined with energy and zeal and good business qualities;" and they assured the Directors that if they appointed Mr. Newton to the position he was seeking, they would obtain "a thoroughly good and reliable officer." It appears that the meeting of the Committee at which the testimonial was given was called at a few hours' notice; and at a subsequent meeting on the 7th inst., one of the members (Mr. Scott) called attention to the matter, and pressed that the testimonial should not be placed upon the minutes in the form of a resolution, as had been proposed. After considerable discussion, he was defeated by a majority of one. The testimonial was therefore duly entered, and it came before the Council in the minutes of the Committee presented last Tuesday. Mr. Coulthard expressed disapproval of the testimonial, and moved that the minutes should be adopted with the resolution relating thereto omitted. The Mayor (Mr. J. Hurst) concurred, and seconded the proposition. The confirmation of this particular minute was, however, moved by Mr. R. Foster and seconded by Mr. R. W. Tweedy. After a long discussion, the proposal that the testimonial should be deleted from the minutes was adopted with two dissentients. The Town Clerk (Mr. A. H. Collingwood) then read a letter from Mr. J. Corbett, the Chairman of the Geltsdale Water Committee, resigning his position, owing to the "untrue and most unjustifiable imputation" cast upon him by the Committee respecting compact with the Engineers, and no apology having been offered to him.

The minutes of the Gas and Water Committee also contained the following resolution: "That the Council be recommended to rescind the resolution passed at their special meeting on the 30th ult. accepting Mr. Newton's resignation; and that Mr. Newton be allowed to withdraw such resignation, and continue to hold his position of Gas and Water Engineer." This came before the Council at a later stage. The Town Clerk read a letter, dated the 12th inst., received from Mr. Newton, stating that he would not withdraw his resignation. After hearing the letter read, the mover of the resolution (Mr. R. Foster) asked to be allowed, with the permission of the seconder (Mr. T. Williamson) and the Council, to withdraw it. Mr. White, in a trenchant speech, protested against the proposal. He said that, after all the trouble, annoyance, and worry that some of them on the Geltsdale Committee had had, especially since the last meeting of the Council, he felt that he must object to the resolution being withdrawn, and must ask the Council to discharge it from the minutes. Mr. Coulthard seconded the motion. A rather warm discussion ensued, at the close of which Mr. Newton stepped forward apparently with the intention of offering some remarks, but he was opposed by Mr. White, amid cries of "Vote" On a vote being taken, the motion (that the resolution be discharged and not withdrawn) was carried by 21 votes to 4. A letter was then read from Mr. Tweedy, resigning his membership of the Geltsdale Committee.

WEST BROMWICH GAS UNDERTAKING.

The Past Year's Working—Jubilee of the Undertaking.

At the last Meeting of the West Bromwich Town Council, the Gas Committee presented a report on the working of the gas undertaking in the financial year ending the 31st of March. They stated therein that the net profit or surplus for the year, after making provision for interest and sinking fund, was £4582; and they recommend that £2000 should be employed in aid of the general district rate for the current year, that £2500 be transferred to the depreciation and suspense fund in reduction of the debit balance thereon, and that the remainder should be carried to the current accounts. The Committee went on to say: "The undertaking has now been established 21 years; the supply of gas by the late Board of Commissioners having commenced on July 1, 1880. The following statement shows the progress during that period—that is, from July 1, 1880, to June 30, 1901:—

—	Year ending June, 1881.	Year ending June, 1901.	Increase.	
				P. Ct.
Coal used. .	15,800 tons	29,500 tons	13,700 tons	86·70
Gas sold . .	141,941,700 c. ft.	310,714,000 c. ft.	168,772,300 c. ft.	118·80
Gas-rental .	£18,690 6s. 5d.	£41,281 11s. 2d.	£22,591	120·80
Meters fixed .	4300	10,521	6221	144·67
Public Lamps	515	996	481	93·40
Length of mains . .	31 miles	45 miles	14 miles	45·16
Percentage of interest on loans to gross income . .	21½ per cent.	8¾ per cent.	..	..
Capital outlay	£146,392	£206,647	£60,255	41·16
Average per 1000 ft. of gas sold . . .	20s. 7·44d.	13s. 3·60d.	..	..
Outstanding debt . . .	£140,778	£182,952	£41,974	29·77
Average per 1000 ft. of gas sold . . .	19s. 10·32d.	11s. 9·31d.	..	..

The gross profits made during the period under review amount to £215,667, of which £118,240 has been appropriated in the payment of interest alone. The amount appropriated for liquidation of the debt amounts to £44,058, of which £23,294 has been applied in actually extinguishing the debt; leaving £20,764 in the fund, to be similarly applied as opportunities arise."

In moving the adoption of the report, Mr. Bushell said the capital account had been increased during the past year by the expenditure of £3159 11s. 4d. in providing further engine and boiler power, and in extensions of the railway siding. To meet this, they raised £2500 of new capital; but, on the other hand, they had paid off old capital to the amount of £4500, so that their loan indebtedness was £2000 less than at the commencement of the year. The sales of gas were still increasing, especially for motive power purposes, which were 35 per cent. higher on the year; the prepayment meter sales being 16½ per cent. They did not expect to increase very much more in the latter class, as there were now 5250 consumers in that section, paying over £8000, or more than one-fifth of the total income from gas. They were, however, very hopeful of considerable increase in the consumption of gas for motive power, since manufacturers now recognized its great advantages for the many and varied trades of the district. For the majority of these trades, gas was cheaper, safer, and more reliable than any other agent. Although the income in the aggregate was £9198 10s. 11d. more than in 1899-1900, the increased expenditure was £9246 6s. 4d. The cost of manufacturing gas, owing to the higher price of coal and other causes, was 4¾d. per 1000 cubic feet above the previous year. Under the arrangements made by the Council at the beginning of the present year, the Committee recommended that £2000 of the surplus profits should be paid in aid of the rates; and they proposed to apply £2500 towards the liquidation of the extraordinary expenditure incurred during the past half-dozen years. The balance of this expenditure would then be about £18,000, which, in his opinion, it was absolutely imperative should be wiped off in the next few years. The undertaking had now attained its majority, and the Committee had much pleasure in calling the special attention of the Council to the statement contained in the report. The only figures which gave the least satisfaction, however, to his mind, were those relating to the provisions made for liquidating the debt. The total amount provided for that purpose only amounted to £44,058—a sum which, in his opinion, should have been much larger. The capital account during this time had grown at a more rapid rate than the provision made for its redemption; and this fact seemed to him to require more attention than it had received. The report was adopted.

ANNUAL REVIEW OF BRADFORD GAS AFFAIRS.

At the Meeting of the Bradford City Council last Tuesday, Alderman W. E. Aykroyd, the Chairman of the Gas Committee, made his annual statement with respect to the working of the gas undertaking during the past year.

Alderman Aykroyd said that a year ago he had to report a great advance in the business of the Gas Department. The output of gas showed a considerable increase; and the profit was the largest that had been earned for many years previously. Unfortunately, however, for the ratepayers, during the year ended March 31 last, the Committee had been obliged to pay enormously advanced prices for coal, and consequently the profits had been less than in any year since the great coal strike of 1892. He was glad to say, however, that the position was not quite so bad as he had feared it would be twelve

months ago. The Corporation had now had the control of the North Bierley gas undertaking for a complete year; but for the purpose of comparison with former years, the North Bierley figures were not included in the statement he had next to make. The quantity of coal and cannel carbonized during the twelve months was 166,435 tons, and the gas made amounted to 1,667,254,000 cubic feet; this being 7·14 per cent. less than in the previous year. There had been produced 71,357 tons of saleable coke, 10,763 tons of tar, and 22,973 tons of ammoniacal liquor. The average cost of coal and cannel had been 14s. 4d. per ton, which was 3s. 5d. more than the average price paid in the previous year. Coke had realized an average price of 10s. 6·22d. per ton; being equal to 3s. 4d. more than a year ago. The Committee had also been fortunate in obtaining 3s. 10·60d. per ton more for tar. Dealing with the revenue account for the year, and again leaving out the North Bierley figures, coal had cost £119,122, or £23,828 more than the previous year. Carbonizing wages amounted to £23,392, or an increase of £170; and purification cost £3539, or £351 more. Repairs and maintenance of works and plant cost £25,504; being an increase of £5812. This was due to the substitution of modern exhausting, condensing, and scrubbing plant at the Thornton Road and Birkshall Gas-Works. The salaries of engineers, managers, and clerks amounted to £3477, or an increase of £352; the maintenance of mains, services, and meters cost £5941, or £59 more; and meter inspection cost £2262, or a decrease of £366. The lighting and maintenance of the public lamps had cost £22,306, or an increase of £12,765; this large increase being due to the alteration of the street lamps to the incandescent system, and to the cost of the street lighting in the added districts, all of which had, he was sorry to say, to be borne by the Gas Committee. In addition to this, there was the value of the gas used for the lamps in the older portion of the city, which was not at present charged for. This would amount to £11,428, and brought up the total cost of the street lighting to £33,734. The collection of accounts cost £500, or the same as in the previous year; printing and stationery cost £398, or an increase of £77; establishment charges and sundries amounted to £1834, or £352 less; rent was £458, or £39 more; and rates and taxes cost £6179, or £250 more. Wages in the gas-stove department and rents and maintenance cost £3089, or a decrease of £192. The chemical works cost for salaries and wages £3285, being an increase of £281; and materials, repairs, and maintenance cost £21,551, or a decrease of £1081. The receipts for gas amounted to £171,263, or an increase of £6379; and the rental of meters was £622, or £5 more. Coke realized £37,528, being an increase of £11,493; tar fetched £13,633, or £1517 more; ammoniacal liquor brought in £10,262, or £3006 less; spent oxide realized £1775, or £403 less; and sundries £20. Rents yielded £1079, or exactly the same as in the year 1900. The sale and hire of gas-stoves produced a revenue of £3350; being £619 more than a year ago. The sale of chemicals yielded £28,325, or an increase of £588. The gross profit for the twelve months was, therefore, £25,018, as compared with £49,814 for the year ended March 31, 1900. From this sum had to be taken £1203 for bank interest, £16,247 for interest on loans, £2260 for income-tax, and £9446 for sinking fund, amounting altogether to £29,156. This left a net loss on the old portion of the gas undertaking of £4137, compared with a profit of £20,534 a year ago. Coming to the North Bierley portion of the gas undertaking, Alderman Aykroyd said the gross profit amounted to £2450, which, with the balance remaining from the last account—viz., £1917—made a total of £4367. The dividends which had to be paid by the Corporation for the first nine months of the year amounted to £3840; and interest and commission on loans, debenture stamps, and income-tax amounted to £2215—making a total expenditure of £6055, and leaving a net loss for the year of £1688, which, added to the loss already mentioned, made a total net loss by the department for the twelve months of £5825. It must, he said, be remembered that the reduction of 10d. per 1000 cubic feet to the North Bierley consumers within the city amounted to £2800 on the quantity sold. If the street lighting were paid for, as in other towns, the Committee would have had, in spite of the increased expenditure, a net profit this year of £27,909.

The minutes of the Committee were adopted.

PROPOSED ADOPTION OF INCANDESCENT GAS LIGHTING AT HERTFORD.

At the last Quarterly Meeting of the Hertford Town Council, the General Committee submitted a report from the Lighting Sub-Committee, appointed to consider what steps should be taken to secure the better lighting of the town. They expressed the opinion that, "at the present time, and under existing circumstances, the streets can be more efficiently and cheaply lighted with gas than with electricity." They therefore communicated with the Gas Company, with the view of making some arrangement for the extension of the incandescent gas lighting system throughout the whole of the town. They had received a letter from the Manager and Secretary (Mr. Robert Watson), which, they said, might be taken as the basis of the arrangement which had been discussed, and which they recommended should be adopted. The following are the principal portions of the letter :—

The Gas Company are willing to enter into an agreement with the Corporation to provide and fix suitable lanterns and No. 4 Kern incandescent burners complete, to all the existing street lamps not now so fitted, and thereafter, during the continuance of the agreement, to maintain both lanterns and burners in good condition for effective lighting (fair wear and tear being assumed) at the following annual charges : (*a*) Short-time lamps at 8s. 6d. each ; (*b*) long-time lamps at 9s. 4d. each ; and (*c*) summer lamps—*i.e.*, such of the above lamps as may be used for summer lighting—at 1s. 6d. each. Where suitable lanterns and Kern burners are already provided by the Corporation, the charges for maintenance per lamp will be: (*a*) 3s. 1d., (*b*) 3s. 11d., and (*c*) 1s. 6d. respectively. The Company are willing that the Corporation should have the option, after the first year, of determining the proposed agreement as to any or all of the public lamps, by giving three months' notice expiring any quarter-day. The Company reserve the like right at the end of the fifth year.

My Directors desire me to repeat that the exclusive adoption of incandescent gas lighting will considerably improve the general lighting of the town. The already existing incandescent gas-lamps, yielding about 60 candles, consume less gas than the flat-flame burners, yielding 15 to 16 candles, as was shown by last year's public lighting account. The following is an estimate of the cost per lamp (exclusive of lighting and extinguishing) of incandescent gas street lighting based on the hours shown : (*a*) Short-time lamps (from Sept. 1 to April 30), burning 1340 hours : Gas, 18s. 9d. ; maintenance, &c., 8s. 6d.—total, £1 7s. 3d. (*b*) Long-time lamps (from Sept. 1 to April 30), burning 2891 hours : Gas, £2 0s. 11d. ; maintenance, &c., 9s. 4d.—total, £2 10s. 3d. (*c*) Summer lamps (from May 1 to August 31), burning 631 hours : Gas, 9s. ; maintenance, &c., 1s. 6d.—total, 10s. 6d.

The Sub-Committee went on to say that the total number of lamps which it was proposed to fit with incandescent burners was 239, of which 22 were already provided with suitable lanterns ; and for these the charge for maintenance would be according to the second schedule. Under the present agreement, which was dated 1896, the Company supplied the street lamps and certain public buildings with gas at 6 per cent. less than the price charged to the ordinary consumer. This agreement was determinable at any time, on three calendar months' notice. The Sub-Committee said they were glad to be able to report that the Company had expressed their willingness to increase the discount to 7½ per cent., if the proposed arrangement was entered into. They therefore recommended that notice to determine the agreement be given, and that the Town Clerk be instructed to prepare a new one embodying the terms offered by the Company. The General Committee recommended that the suggestions contained in the report should be adopted, and the seal of the Corporation affixed to the necessary agreement.

The Mayor (Mr. A. Purkiss Ginn) formally moved—"That an arrangement on the basis of the terms contained in the report of the Lighting Sub-Committee be entered into with the Hertford Gas Company ; that the Town Clerk be instructed to prepare the necessary agreement embodying these terms ; and that the Mayor be authorized to seal the same on behalf of the Corporation." He remarked that if the Council went in for the scheme, they would acquire a greater number of lanterns than was at first expected. Besides, they were binding themselves for some years ; and he must admit that he should like to have seen what the electric light could have done before they did so. Alderman Haddon seconded the motion. Mr. Baker agreed with the Mayor that the matter went beyond what the Corporation anticipated. He must admit they had come to what appeared to be a very reasonable and fair arrangement with the Directors of the Gas Company ; but when they came to look more closely into the matter, he thought that it was one that the Corporation should hesitate in sanctioning. He entirely approved of the continued lighting of the town with gas by incandescent burners, as there could be no doubt that by this means they could get sufficient light for street purposes at a much less cost than by electricity. He moved, as an amendment, that the subject be referred back to the Sub-Committee. Mr. Burton seconded the amendment, and it was carried by seven votes to two.

ELECTRIC LIGHTING NOTES.

The Tynemouth Town Council have agreed to the borrowing of £23,000 for extensions at the electricity works.

There was a breakdown of the electric lighting system at Hull last Saturday week, on the occasion of the severe storm in the North. It appears that the heavy rain flooded the mains, and damaged the generating plant.

It was reported at the meeting of the Cleckheaton District Council last Tuesday that the Local Government Board had sanctioned the borrowing of £24,990 for the carrying out of the electric lighting and refuse destructor scheme ; the periods of repayment to be : As regards £7560 for destructor works, twenty-six years ; as regards £16,653 for electricity works, twenty-five years ; and as regards the remainder, fifty years.

We learn from a paragraph in Saturday's "Birmingham Evening Mail," that, with a view to popularizing the use of the electric light as an illuminant, the District Council of Farnworth, near Bolton, supplied it free of charge to all intending customers until the formal opening of their new electricity works to-day. The innovation, which was watched with interest by Lancashire municipal and other authorities, was, we learn, taken advantage of by a large number of business people in the town.

Boston, in Lincolnshire, is a town of the type in which the prospects of success for an electric lighting scheme are very visionary. But the Town Council may think otherwise, as they have instructed an electrician—Mr. A. Collins—to report to them on the question of an installation. The project recommended is estimated to cost £28,500 ; and the sanguine Mr. Collins puts the profit at £2153, "when the works are fully loaded." Does he expect that they will ever arrive at that happy condition ? He suggests that the Council should charge 4·75d. per unit for private lighting, and 2·25d. for public purposes.

At the meeting of the Dublin Municipal Council on Monday last week, a letter was read from the Secretary of the Commissioners of Public Works, intimating that the Commissioners have received the authority of the Lords Commissioners of His Majesty's Treasury to make a loan of £254,500 to the Corporation for electric lighting purposes, but adding significantly that in future instalments of Government loans made to the Corporation are to be paid on the days on which they are due, and that so long as the rates within the city remain at their present figures no hope can be entertained of further Government loans.

An interesting electric lighting scheme, but a doubtful one in respect of its financial success, is put forward by the Stockton Rural District Council. They have resolved to apply to the Board of Trade for a Provisional Order empowering them to supply electricity for lighting and motive power. It is not proposed to erect an electric power plant, but to purchase in bulk from the Cleveland and South Durham Electric Power Company or the Stockton Corporation, and retail it to ratepayers in the principal villages of the district—namely, Eaglescliffe, Norton, Preston-on-Tees, Billingham, Carlton, Hartburn, and other places which come under the control of the Rural District Council.

Six months have now elapsed since the electric light first appeared

in the streets of Lowestoft, and already the ratepayers are beginning to learn something about it that they did not know before. Of course, it is rather early to judge, but the prospect cannot be described as promising. The current was switched on on Feb. 12; and the Borough Accountant has made up the accounts to June 30. The net result is that the district rate has had to contribute £1063 19s. 9d. in order to make both ends meet. This is on a capital expenditure of £26,830; and the amount still to be spent is £23,170. Then the estimate for the current six months puts the sum which will have to be provided at £1213. However, the Chairman of the Committee considers it will "not be long" before a profit is shown. The ratepayers would no doubt like the Chairman's definition of the word "long."

The quarterly meeting of the Whitehaven Town Council last week was largely taken up by a discussion on electric lighting, arising out of two recommendations of the Water and Lighting Committee—viz., the appointment of an Assistant-Electrician and an increase in the charges for electric current. Mr. Musgrave explained that the former was necessary owing to the pressure of work and the efficient supervision of the valuable plant at the electrical station. The increased prices for current were requisite to meet expenditure, as on the present rate there would be a considerable deficit at the end of the year. He pointed out that the existing charges were only one-half of those recommended by Dr. Hopkinson, and that the proposed increase would only make the price of electricity equal to gas at 3s. 6d. per 1000 feet—5d. less than the figure in Whitehaven. The recommendations were confirmed.

After long delay, the Stertford District Council have at length decided to provide electrical energy for the district. A Provisional Order for the purpose was granted by the Board of Trade in 1897; and negotiations were entered into for its transference to the Manchester Corporation, who were to undertake the Stretford Tramways Order. The District Council, however, deferred for a considerable time their acceptance of the terms offered by the City Electricity Committee; and, in a recent interview, the Committee declined to renew the offer. Consequently, the District Council requested Mr. C. H. Wordingham to prepare a report as to the advisability of themselves undertaking the work. In a voluminous pamphlet, Mr. Wordingham has reviewed the whole situation, and recommends the Council to establish their own electricity supply, which he estimates will entail a cost of £36,800, exclusive of the expenditure which the equipment of the tramways will require.

In the period between 1883 and 1900, there were 639 electric lighting schemes sanctioned by Parliament by means of Provisional Orders Of these 119 have been revoked or repealed. Last year, 108 Orders were applied for, 99 of which were granted by the Board of Trade, but only 98 were confirmed by Parliament. When the first Electric Lighting Act came into operation (in 1883), 69 Orders were granted; but the next year there were only four, and in 1886 there was but one. In 1887, not a single application was made, and only one in 1888. On the law being amended in 1890, there was renewed interest in electric lighting. But though 161 Orders were applied for, only 74 were confirmed by Parliament. Since then the numbers have ranged from 15 (in 1893) to 98. In the period above dealt with, there were 48 applications for licences, of which 32 were granted by the Board of Trade; and of these 31 have been either revoked or repealed, or the time for which they were granted has expired.

Although there has been a good deal of boasting as to the success of the Plymouth Corporation electricity undertaking, apparently the financial results have not come up to the expectations of its friends. At a meeting of the Town Council on Wednesday, attention was called to the fact that while the Electricity Committee had had before them a statement with reference to the estimated and actual cost of the first year's working, nothing was said about submitting this to the Council. Mr. Page, the Chairman of the Tramway Committee, in commenting upon this, said he looked forward to the return with a great deal of anxiety. Originally the Electrical Engineer estimated the working expenses at £3815, and the capital charges at £2497—a total of £6312. A return by the Borough Treasurer, however, showed that the working expenses were £5642, and the capital charges £3097—a total of £8739, or an excess of £2427 over the estimate. The revenue had also exceeded the estimate, but only by £500; so that there was a a deficiency of £1900. The Mayor (Mr. J. A. Bellamy) suggested that criticism should be withheld until they had the report; and the Council accordingly decided to ask for its production, unless there was strong reason for not submitting it. The Plymouth electricity works have been held up as a model of Corporation enterprise. They were designed not only for the supply of current for lighting purposes, but for the working of the tramways, and therefore commenced business with a considerable demand waiting to be supplied. Since then there has been extensive development both in the lighting and in the use of current for traction.

Public Lighting at Holywell.—The Holywell District Council have accepted an offer of the British Gaslight Company to light the public lamps from one hour after sunset to midnight for eight months at £1 19s. 6d. per lamp, instead of as formerly from one hour after sunset to one hour before sunrise, at £2 9s. 3d. per lamp.

Aberavon Water Scheme Adopted.—An adjourned meeting of the Aberavon Town Council was held last Wednesday evening to consider the Ystradfellte water scheme. Mr. T. A. Burgess, the Chairman of the Finance Committee, moved the adoption of the scheme. He quoted figures to prove that in seven or eight years' time, when the scheme would be ready, Aberavon would be quite able to bear the burden of its cost. The great objection he had to the taking of a supply from Margam was that the Council were only entitled to contract with them for their surplus water, which to his mind was fatal to the scheme. In the event of a curtailment of supply, the works in the Margam district could claim priority over consumers in Aberavon. He estimated that the Ystradfellte scheme would cost them, when the works were completed, £1100 per annum; but for this outlay they would not only be joint owners of the works, but the water would meet the requirements of the town for all time, and they would be placed in a position to compete with Margam in the disposal of water for works purposes, which they were totally unable to do at present. The motion was carried practically unanimously.

AUDITING OF GAS COMPANIES' ACCOUNTS.

In the August number of the "Accountant's Magazine" (Edinburgh: W. Blackwood and Sons) is published an article by Mr. F. G. Newton, with the above title. By the courtesy of the Editor of the Magazine, we are able to reproduce the article, which deals with a subject of considerable importance to the gas industry, practically in its entirety.

After referring to a previous article on the general subject of the auditing of public companies (in which he outlined a policy whereby the audits of the accounts of such companies might be rendered as effective as possible), the writer proceeds: It has appeared to me that I might usefully offer some suggestions as to how that policy could be put into practice in the auditing of some particular class of public company; and accordingly I propose to consider the accounts of the larger gas companies—whose transactions are numerous, varied, and of considerable magnitude. That these accounts merit careful examination, and that their thorough audit is no light matter, will be readily understood when it is observed that the income of the three chief Metropolitan Gas Companies (The Gaslight and Coke, the South Metropolitan, and the Commercial Gas Companies) amounted in 1899 to the sum of £6,166,588.

The aim of my previous article was to protest against the argument put forward by Counsel in the Millwall case, and accepted by many people: "That if a company have dealings of varied character, of large extent, and with many customers, it is obviously impossible or impracticable for the auditors to check all the entries relating to every transaction; that, therefore, they are obliged to accept the certificate of the staff for the accuracy of all the multifarious items which go to make up the aggregate totals of business done; and that they can only be expected, in the time at their disposal, to examine the accounts laid before them, with certified returns purporting to be digests of the many books which contain all the details of the firm's numberless dealings with merchants and customers." That such a futile theory of audit was quite inadmissible, I endeavoured to demonstrate, and asked the question: Is there any third alternative to the two extremes indicated —namely, of examining every item in the books of a company, or of accepting without question the certificate of its officials for the accuracy of the books?

The third alternative I contended was to be found in the auditors of a company adopting the policy of "first making themselves thoroughly acquainted with the whole of the system on which the accounts of the company are kept (from the most elementary entries, right through all the intermediate books, up to the final accounts); and then making it their practice—without following any set routine, by which the staff could obtain fore-knowledge of what the auditors would or would not examine—to check from time to time some of the entries in every book, tracing the entries through to the balance-sheet. In other words, to audit samples; it being impossible to examine the bulk."

It should be added that every auditor would do well to acquaint himself with the system of inter-staff examination adopted in any company whose accounts he has to audit, in order that he may be the better able to judge of the value of such certificates as are laid before him—always, of course, remembering that these certificates only supplement, and do not in any way dispense with, his own personal testing of the accuracy of the books or returns certified. Wherever possible, the accounts of one department should be vouched for by the members of another and independent department. Auditors should not hesitate to represent the need for such a system to the directors of companies.

Such is, in outline, the system that—granting the impracticability of the ideal—would be found, I believe, most efficient for the examination of the accounts of industrial concerns of magnitude, and which would enable the auditors to sign the balance-sheets without forfeiting their self-respect. It is now proposed to consider the various sections of a gas company's accounts, and to note any particular items the accuracy of which it is essential to frequently test. The form of a gas company's accounts is determined by the schedule to the Gas-Works Clauses Act Act, 1871 (subject to variations approved by the Board of Trade); so we may usefully deal with the different sections consecutively.

Capital.

The first two sections comprise statements of the share and loan capital of the undertaking. The amounts shown therein as "authorized" can be checked with the Acts of Parliament or Provisional Orders granting authority to raise the capital. The amounts issued and paid-up should be compared with the aggregate of the holdings shown in the share registers of the company—the items of which may with advantage be occasionally verified by the actual deeds of transfer —and then carried forward to the credit of No. 3 (or the capital) account, into which is further brought the premiums received on issues of new capital. The amount of these premiums can, of course, be checked at the time the capital is issued, by deducting from the receipts on capital account at the company's bankers the amount of the nominal capital sold. The debtor side of No. 3 account shows half-yearly the amounts expended under the general headings of extension of works (including land, buildings, and machinery), new and additional mains and service pipes, meters, and stoves—less credits for the sale of disused machinery, &c., or of surplus land.

These are amounts that require very careful examination, involving consideration not merely of their arithmetical accuracy and of the vouchers for their expenditure, but of the legitimacy of their being charged to capital account. In pursuance of the policy already laid down, auditors should themselves occasionally visit works at which capital is, according to the company's books, being expended, and satisfy themselves that the expenditure is really being made upon enlargements or improvements and not upon renewals—the principle upon which gas companies work being to make no provision for depreciation, but to charge all renovations and repairs to revenue. In the case of gasholders, which are very costly to replace, and do not lend themselves to perpetuance by repairs, a certain small percentage on the cost of the holders should be annually set aside out of revenue to provide for their eventual replacement. In most companies, however, the plan is adopted of making revenue bear this cost subsequently to

the renewal (the charge being often spread over more than the current year by means of a suspense account); but the obviously correct method is the accumulation of a depreciation fund during the life of the holders. The amount shown in the capital account as expended on plant should, I hold, be represented by plant of that value maintained in efficient repair, or by plant *plus* a fund equal to the amount of its depreciation. Auditors should therefore endeavour to ascertain whether works are being maintained in fair repair, and not allowed to unduly depreciate—to the advantage of present, but the detriment of future, shareholders.

Having satisfied themselves that the amounts charged to capital are in respect of additions to works or plant legitimately chargeable thereto—for which purpose they should occasionally (in addition to the suggested inspection of the works) call for and examine the contracts entered into for the execution of the extensions and the minutes of the directors authorizing the expenditure—there remains the work of verifying the amounts so charged with the actual cash expended or liabilities incurred on the work in question. Here, in accordance with the policy of auditing that I have defined, the examination would not be limited to a comparison of the amounts with the ledgers or summaries of ledgers. Some of the items should be traced to their source; the entry in the ledger compared with the account rendered by the contractor; the prices charged by the contractor checked with the estimates sanctioned by the directors; and, as I have said, the work charged for as executed—say a gasholder tank excavated, or a retort-house built—actually inspected at the works. Many an auditor has, I am convincd, passed an expenditure of £50,000 on holders or machinery or buildings without ever seeing a shilling's worth of holder, machine, or retort-house to prove to him that the money spent was really represented by value received.

The expenditure on mains, meters, or stoves, cannot be tangibly verified in the same way. But the accounts for their purchase can be as carefully overhauled and compared with the contracts sealed by the directors; while, if a proper system of stock ledgers be kept, the number of meters and stoves charged to capital should be capable of at least approximate verification with the number shown in the rental ledgers as in use by the company's consumers. When new mains are charged to capital, the auditors should occasionally call for the surveyor's maps of the company's mains, and see that those whose cost is carried to capital are really additional pipes, or are of larger capacity than those they replace. In the latter case, of course, only the difference between the cost of the smaller and of the larger mains would be a fair charge to capital.

In addition to this independent check upon the vouchers for the amounts charged to capital, the auditors should further see that every voucher they examine is certified by the engineer of the company for the receipt of the goods or the execution of the work, and that the accounts have been properly certified for correctness of price, calculations, and so forth. Some of these accounts should further be tested in these respects by the auditors themselves. Where any considerable item of wages is charged to capital, it should be ascertained from the contracts that the cost of labour was not included in the specifications.

Revenue

Statement No. 4—the revenue account—is, it is scarcely necessary to remark, of vital importance. The audit of the debtor or outgoings side of the account involves the examination of very heavy expenditures upon materials and wages. The three Metropolitan Companies to whom I have referred buy, in round figures, 3 million tons of coal and oil annually, and have a yearly wage-bill of something over a million-and-a-half sterling. As coal at present (January, 1901) costs the Companies £1 a ton, their expenditure on the two items of fuel and labour amounts to about £4,500,000 in a year—rather a big sum to sign for as "examined and found correct." It would be interesting to know what steps the auditors of these companies take to assure themselves that that total of four-and-a-half millions has been actually and rightly expended!

So far as coals are concerned, there are several checks that may usefully be adopted. The auditors should occasionally make sure that the quantities invoiced as delivered do not exceed the quantities purchased by the directors under contract; that the quantities are charged for at the contract rates, and the amount properly calculated therefrom; and that the quantities are certified for as received at the works by the engineer. A conspiracy between the contractor to deliver, and the works officials to accept, short delivery would, it must be admitted, be exceedingly difficult of detection by an auditor; the safeguard being mainly the amount of collusion involved. But the unloaders or weigh-bridge vouchers might with advantage be occasionally compared with the invoices. Any extensive fraud of the character suggested would, it is true, show in the accounts a low return of gas made per ton of coal used; but, owing to the varying qualities of gas coal, the fall would need to be heavy for it, of itself, to excite suspicion. The carbonizing statistics should, however, be watched, and, if suspected, called in question by the auditors.

Besides coals, there are, of course, numerous other classes of goods purchased for use either in the process of gas manufacture—tools and appliances, lime and other materials for the purification of the crude gas, &c., &c.—or in the repair of plant and machinery; large quantities of fire-bricks for renovating retorts; timber, iron, and so forth. Meters, stoves, and gas-fittings, to replace those worn out, also figure in the outgoings. All these purchases should be from time to time tested, the goods certified to have been received being checked into the stock books, the orders sanctioned by the directors seen to be not exceeded, the prices to be in accordance with the contracts sealed, the charge to be correctly calculated and properly posted in the credit ledgers, and the discharge in those ledgers to agree with the cash-book entries.

This may well lead to a consideration of the examination of the cash book, as not a few of the entries in the revenue account are derived direct from the statements of cash paid. Goods required for the purposes of manufacture or for repair are, of course, charged to revenue when used, not necessarily when paid for; but items such as wages and salaries, annuities, directors' allowances, and sundry miscellaneous expenses are direct cash disbursements. These should all (excepting wages) be carefully compared with the receipts, and also seen to be duly authorized payments—for instance, the salaries and annuities paid should occasionally be compared with those granted by the directors; parliamentary and law charges, with the solicitors' bills; the payments to public officers, with the requisitions made by the Board of Trade; rents, with the leases of the properties in respect of which they are paid; taxes, with the demands of the authorities; and directors' allowances, with those authorized by the company's Acts. Should there be amounts accrued but unpaid on any of these accounts, the auditors will, of course, see that they are included as liabilities in the balance-sheet.

The wages account is, admittedly, the most difficult of all to efficiently check, as, short of the auditor attending at the works and verifying the number of men shown on the pay-sheet by means of a roll-call (in the way of which not a few difficulties might be found to lie), there are no means of detecting the existence of bogus names on the pay-sheet. Auditors should, of course, insist, and occasionally take steps to ascertain, that the same person that makes up the sheet should not have the paying of the men or any handling of the cash whatever. No robbery could then take place without collusion—a valuable, but by no means infallible, safeguard against fraud. The rates of pay should, from time to time, be examined with those authorized by the directors; the calculations checked; and tests made of the additions, of the summaries, and of the entries into the cash book.

The debtor side of the cash book includes some items that go direct to the credit of revenue. Of these, the amount of rents received should be compared with the agreements under which any of the company's property is let; the plans of the properties held by the company can be compared with the particulars of all capital payments in regard to land, &c., and note made of such as are not used for the purposes of the undertaking. There are, besides, small amounts received for transfer fees, and considerable sums for the sale for cash of coke, tar, and other residual products. The prices at which these residuals are sold should now and again be tested with market rates; and an auditor visiting the works could assure himself that the quantities returned as sold were calculated on these returns at the same prices as those charged to the public.

Reverting now to the revenue account, there remain the principal items of a gas company's income to consider—namely, the revenue from, first, the sale of gas, and, second, of residual products (other than cash transactions). The sales of gas and rents of meters and stoves should be verified from the ledgers generally known as rental ledgers. The entries in these books should be occasionally tested by comparing some of the consumptions of gas charged to the public with the meter index returns sent in by the index readers—checking the amounts debited to the consumers by working out the consumptions at the price current for the time being; testing the additions of the ledgers; and checking the totals thereof on to the summary, and the summary into the journal, and so into the revenue account. At the same time the auditors should satisfy themselves that all the rental ledgers are checked by clerks other than those posting them up. The additions of the cash shown therein as paid should also be tested, and the totals compared with the cash book. A further check upon the sales of gas is to see that the quantity accounted for as sold in the rental ledgers approximately agrees with that registered by the large meters at the works as having been sent out for consumption. There is, in the case of all companies, a small percentage of the quantity distributed unaccounted for when the aggregate of the readings of the consumers' meters is determined; but the percentage should not materially vary from quarter to quarter in the case of one and the same concern. This is, however, only a rough check upon the gas revenue.

Another item that wants occasional examination in the rental ledgers is that of bad debts—which was not dealt with when the debtor side of the revenue account was under consideration. The amount should be watched each half year, and, if heavy above the average, investigation made at once. Even when not unduly large, the items should now and again be examined, and the auditor should satisfy himself that unavailing application has been made for the money by some official other than the one originally entrusted with the collection of the account.

In the case of sales of coke and other residuals, the system is adopted in some, and should certainly be adopted in all, gas-works of issuing to every customer or carman carrying goods off the works a voucher for the quantity he is authorized to remove; and the gate porter must be given the voucher before he will allow the goods to leave. Every customer's account can, therefore, and some customers' accounts should occasionally, be checked with these vouchers, and with the received notes signed by the purchaser. The prices charged should be tested with current or contract rates, as the case may be; the calculation and ledger entries examined; and the summaries of the ledgers tested and finally compared with the journal, and thence the revenue passes into account.

Every item in this, the gross revenue account, having been tested, the balance is carried forward to the credit of No. 5 (or the net revenue) account. This statement shows how the amount of the balance brought forward from the previous half year, *plus* the net revenue for the account half year, and the interest on moneys deposited (if any), is disposed of—that is to say, by the payment of dividends, debenture interest, and interest on temporary loans (if any). The items of dividends and debenture interest payable can be calculated from the amounts of the issued stocks and shares, and should be compared with the registers, which in their turn may from time to time be tested by a comparison of the paid dividend warrants with the transfer deeds.

No. 6 is the reserved fund account, the balance of which should be invested in consolidated stock. This ought, of course, to be verified with a statement by the Bank of England of the amount of the company's holding.

Statements Nos. 7, 8, and 9 do not deal with money, but are records merely of the purchases, makes, consumptions, sales and stocks of coals, residual products, and gas. The purchases of coal and sales of gas have already been verified and compared with the revenue account. Upon the makes of residual products, there is little real check other than the certificates of the works managers. They should, however, bear roughly certain proportions to the quantity of coal carbonized. A ton of gas coal produces about 12 cwt. of coke, 11 gallons of tar, and 28 lbs. of sulphate of ammonia; but such figures only afford an approximate check upon the accounts, and only serious deviations therefrom

would call for closer investigation. The most important items to the auditor in these statements of coals and products are those of stocks in hand, which may be said to bring us to the balance-sheet; and we will consider them in their due order in that final account.

The Balance-Sheet.

The items on the debtor side of this statement include, first, the balance of unexpended capital, the balances at the credit of the net revenue and reserved fund accounts, and any other funds that may exist. The checking of these, and of the amounts due for interest on mortgages, bonds, debenture stock, and other loans, are simple matters. The amounts due to sundry creditors need to be very carefully tested with the ledgers and with the actual accounts; while it is essential that all outgoings of cash should be tested by comparing actual entries in the pass-books with those in the ledgers. In this way only is it possible to safeguard against the manipulation of this large item.

Similarly, on the credit side of the balance-sheet, the amounts due from sundry debtors should be carefully tested with the charges made in the ledgers (and previously examined); all cash received having been also seen, by testing, to have been duly posted in those ledgers. It will be remembered that it was by systematic and very extensive over-representation of the amounts due from their customers that the accounts of the Millwall Dock Company were made to show year after year profits far in excess of those actually earned. In the case of the three Metropolitan Gas Companies, the accounts shown at the end of the year as owing to these Companies represent a sum of about a million-and-a-half. A small percentage on this amount would go far to cover up an unfavourable year's working; and it certainly behoves auditors to make themselves thoroughly satisfied as to the genuineness of the asset.

Other items among the assets are cash at bankers or on deposit, amounts invested in Consols, and stocks in hand. The first two would be checked by any auditor in proper fashion; the last, I am afraid, by very few. In regard to the stocks of coal, coke, tar, and sundry stores, it may be pointed out that it is extremely easy to gloss over a bad year or two by over-estimating the quantities or values of these assets. It therefore behoves an auditor to invariably give them his careful attention. A ton of coal occupies about 42 or 43 cubic feet of storage room. With that fact in his mind, it ought not to be difficult for an auditor, visiting a works on the last day of a half year, to estimate the quantity of coal in the stores sufficiently nearly to prevent material fraud or manipulation of account, and so with coke, tar, and ammoniacal liquor. Yet how many auditors ever dream of seeing for themselves whether there is 1000 or 20,000 tons of coal or gallons of tar in stock? The quantities having been satisfactorily checked, the valuation is simply a matter of ascertaining the purchase cost of the coal and the market value of the residuals, and then seeing that these quantities have been correctly multiplied by the unit price. But the valuing out of quantities that have never been verified by any personal examination —which is about all that the majority of auditors ever do—is but a sorry farce, unless the character of the stock audit is fully explained in the wording of the auditor's certificate. For an auditor to put "Examined and Found Correct" at the foot of a statement of assets valued at a million sterling, for the existence of (say) five hundred thousand pounds' worth of which he could not swear without committing perjury, is, in my opinion, as discreditable as it is certainly misleading.

I have now run over the principal items in a gas company's accounts, and indicated, as clearly as it is possible in a limited space to do, the means whereby an auditor could make an examination which—although in the nature of the thing necessarily incomplete—would justify him (if he found all he tested accurate and straightforward) in concluding that the bulk was as good as the samples he had himself selected at random, and in certifying the accounts. That examination, if conscientiously conducted, would involve no little labour. But an audit is essentially a work that is, if worth doing at all, worth doing well; and I would conclude, as I concluded my article on the general subject of company auditing, by saying that, if auditors protest that the remuneration they receive for the examination of the accounts of big business undertakings is not sufficient to compensate them for the time and labour required for the working of such a system as I have indicated,* let them lay the matter plainly and frankly before the directors and shareholders, and not continue to draw paltry fees, and, in exchange, to conduct a useless, valueless, farcical examination.

Let, moreover, the governing bodies of the profession do their part, and make it an offence, punishable with forfeiture of membership, for any professional accountant to accept the post of auditor to a company that refuses to attach a proper salary to the office. Much will then have been done to achieve the end I have had in view in all that I have written—namely, the elevation of the status of the auditor, and the re-establishment in the mind of the man on the market of full confidence in the reality and reliability of an auditor's examination and certificate. Is it for the good of the profession that the general comment on an auditor's certificate should be—as it is—that "that is all very well, *so far as it goes;*" with the addition, or the obvious suppression, of the further opinion—"and that is not very far?" Surely not. But what is the profession doing to silence it?

Barnet District Gas and Water Company.—The accounts of this Company for the six months ending the 30th of June show a balance of £14,084 on the profit and loss account; and at the half-yearly meeting on Friday the Directors will recommend the declaration of dividends, less income-tax, at the rates of 7, 6, and £4 18s. per cent. per annum on the various stocks and shares.

* It may be worth while to call the attention of auditors to the fact that section 108 of the Companies Clauses Consolidation Act, 1845, enacts that: "It shall be lawful for the auditors to employ such accountants and other persons, as they may think proper, at the expense of the company"—a power which has been held to be conferred on each individual auditor. See *Steele v. Sutton Gas Company*, 12 Q.B.D., 68.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 441.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 12	10½	Alliance & Dublin 10 p.c.	18½—19½	..	5 7 8
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
300,000	100	July 1	5	Australian 5 p.c. Deb..	100—102	..	4 18 0
200,000	5	May 15	6½	Bombay, Ltd. . . .	6—6¼	..	5 0 0
40,000	5	,,	6½	Do. New, £4 paid	4¼—4¾	..	5 9 5
380,000	Stk.	Aug. 15	12	Brentford Consolidated	257—262*	+3	4 11 7
270,000	,,	,,	9	Do. New . . .	185—190*	..	4 14 9
50,000	,,	,,	5	Do. 5 p.c. Pref. .	126—130*	..	3 16 11
206,250	,,	June 14	4	Do. 4 p.c. Deb. .	111—114	..	3 10 2
220,000	Stk.	Mar. 14	10	Brighton & Hove Orig.	222—227	..	4 8 1
226,320	,,	,,	7	Do. A. Ord. Stk. .	155—160	..	4 7 6
1,047,500	Stk.	Feb. 27	5	Bristol, 5 p.c. max. .	121—123	..	4 1 4
420,000	20	Mar. 28	10	British.	41—42	..	4 15 3
50,000	10	Aug. 15	12	Bromley, Ord. 10 p.c. .	24—26*	+½	4 12 4
82,850	10	,,	9	Do. 7 p.c. . . .	19—21*	+½	4 5 8
500,000	10	May 31	6	Buenos Ayres (New) Ltd.	8¾—9¼	..	6 9 9
220,000	Stk.	June 28	4	Do. 4 p.c. Deb.	94—97	..	4 2 6
150,000	20	July 17	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	May 31	10	Cape Town & Dis., Ltd.	15—16	..	6 5 0
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
550,000	Stk.	Apl. 12	12	Commercial Old Stock	270—280	..	4 5 9
236,425	,,	,,	9	Do. New do. .	205—210	..	4 5 9
238,237	,,	June 14	4½	Do. 4½ p.c. Deb.	128—133	..	3 7 8
800,000	Stk.	May 31	9	Continental Union, Ltd.	158—163	..	5 10 5
200,000	,,	,,	7	Do. 7 p.c. Pref.	160—165	+2	4 4 10
575,000	Stk.	Feb. 28	5	Crystal Palace Ord. 5 p.c.	120—125	..	4 0 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	125—130	..	3 16 11
486,090	10	July 17	10½	European, Ltd. . . .	19—20	..	5 5 0
354,060	10	,,	10½	Do. £7 10s. paid	14—15	..	5 5 0
15,079,885	Stk.	Aug. 15	4 4/10	Gas-light & Coke . .	91—93*	..	4 14 7
2,600,000	,,	,,	3½	Do. 3½ p.c. max.	88—90*	..	3 17 9
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	110—113*	+1	3 10 10
4,063,425	,,	June 14	3	Coke 3 p.c. Con. Deb.	91—93	..	3 4 6
70,000	10	May 31	8	Hongkong & China, Ltd.	13—14	..	5 14 4
3,800,000	Stk.	May 15	10	Imperial Continental .	207—210	..	4 15 3
473,600	Stk.	Aug. 15	3½	Do. 3½ p.c. Deb. Red.	99—101*	..	3 9 4
561,000	Stk.	Feb. 28	10	Liverpool United A	236—238	..	4 4 0
678,100	,,	,,	7	Do. do. B	172—176	..	3 19 7
306,083	,,	June 28	4	Do. do. Deb. Stk.	118—120	..	3 6 8
75,000	5	June 14	4	Malta & Medn., Ltd. .	4½—5	..	4 0 0
560,000	100	Apl. 1	5	Met. of 5 p.c. Deb.	106—109	..	4 11 9
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	May 31	3½	Monte Video, Ltd. . .	9—10	..	7 0 0
717,946	Stk.	Aug. 9	8½	Newc'tle & G'tesh'd Con.	226—227	..	3 14 11
312,855	Stk.	June 28	3½	Do. 3½ p.c. Deb.	97—99	..	3 10 8
150,000	5	May 15	8	Oriental, Ltd. . . .	7¼—7¾	..	5 3 3
135,000	5	,,	8	Do. New, £4 10s. pd.	6¼—6¾	..	5 6 8
15,000	5	,,	8	Do. do. 1879, £1 pd.	1¼—1¾	..	4 11 5
					*Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Feb. 28	7	Ottoman, Ltd. . . .	5⅞—6⅛	..	5 12 0
851,070	10	Apl. 26	7	River Plate Ord. . .	10⅞—11⅛	..	6 4 5
250,000	Stk.	June 28	4	Do. 4 p.c. Deb..	96—98	..	4 1 8
250,000	10	Mar. 28	8	San Paulo, Ltd.. . .	10¾—11¼	..	6 19 1
135,000	Stk.	Mar. 14	10	Sheffield A	240—245	+5	4 1 8
209,984	,,	,,	10	Do. B	238—243	+3	4 2 4
523,498	,,	,,	10	Do. C	237—242	+2	4 2 8
5,761,885	Stk.	Aug. 15	5	South Met., 4 p.c. Ord.	123—126*	..	3 19 4
1,627,965	,,	July 17	3	Do. 3 p.c. Deb. . .	91—94	+1	3 3 10
380,940	Stk.	May 15	5	Southampton Ord. . .	106—111	..	4 10 1
70,825	,,	July 17	4	Do. 4 p.c. Deb.	104—109	..	3 13 5
120,000	Stk.	Feb. 28	6	Tottenham and Edmonton A. 5 p.c.	115—120	..	5 0 0
250,520	,,	,,	4½	Edmonton B. 3½ p.c.	85—90	..	5 0 0
182,380	10	Jan. 16	5	Tuscan, Ltd.. . . .	8—9	..	5 11 1
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	95—100	..	5 0 0
230,000	5	Aug. 15	9	West Ham, 10 p.c. . .	9—10*	+½	4 10 0
172,000	10	,,	6	Do. 7 p.c. . .	11—12*	..	5 0 0
140,900	Stk.	June 28	4	Do. 4 p.c. Deb.	103—108	..	3 14 1
				WATER COMPANIES.			
780,599	Stk.	June 28	11	Chelsea, Ord. . . .	285—290	..	3 15 10
150,000	,,	,,	5	Do. 5 p.c. Pref. .	150—155	..	3 4 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	137—140	..	3 4 4
175,785	,,	Mar. 28	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
1,720,560	Stk.	Apl. 12	7	East London, Ord.. .	187—192	..	3 12 11
654,740	,,	June 14	4½	Do. 4½ p.c. Deb. .	143—148	..	3 0 10
980,169	,,	,,	3	Do. 3 p.c. Deb. .	94—96	..	3 2 6
700,000	50	June 14	8	Grand Junction 10 p.c. max..	102—105	..	3 16 2
310,000	Stk.	Mar. 28	4	4 p.c. Deb..	123—127	..	3 3 0
708,000	Stk.	Aug. 15	14	Kent	275—285*	+2	4 18 3
160,000	,,	,,	7	Do. New, 7 p.c. max..	198—203*	+1½	3 9 0
1,043,800	100	June 28	10½	Lambeth, 10 p.c. max..	265—270	+2½	3 17 9
406,200	100	,,	8	Do. 7½ p.c. max..	204—209	+4	3 16 7
350,000	Stk.	Mar. 28	4	Do. 4 p.c. Deb..	123—126	..	3 3 6
500,000	100	Aug. 15	12 8/10	New River, New Shares	390—395*	+1½	3 4 6
1,000,000	Stk.	July 31	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
902,300	Stk.	June 14	6	South-wark Ord. . . .	172—177	..	3 7 9
126,500	100	,,	6	7½ p.c. max.	162—167	..	3 11 10
489,200	Stk.	,,	5	and 5 p.c. Pref. .	147—152	..	3 5 9
1,019,585	,,	Apl. 12	4	Vauxhall 4 p.c. A Deb.	123—128	..	3 2 6
1,155,066	Stk.	June 14	10	West Middlesex. . .	264—269	+1	3 14 5
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	138—143	..	3 2 11
200,000	,,	Mar. 14	3	Do. 3 p.c. Deb. .	95—98	..	3 1 3
					*Ex. div.		

CAPE TOWN DISTRICT WATER COMPANY.

Winding up the Concern.

A Meeting of the shareholders in this Company was called for last Thursday to receive a statement from the Liquidators (Messrs. J. S. Prince and J. H. Brodie) as to the realization of the Company's assets and the distribution of the proceeds—the property having been purchased by the local Municipalities. Mr. Prince presided. He stated that the amount received from the Municipalities of Woodstock and Claremont for the fixed assets under the award dated Feb. 21, 1900, was £219,350. Then for stores, materials, book debts, and cash balances (less trade liabilities) at Jan. 1, 1899, they received £14,253. The interest from Jan. 1, 1899, to Oct. 16, 1900, from the Municipalities amounted to £15,925; on deposits, less interest paid on loan, £525; and sundry receipts £58. The last three items together came to £16,509. It would therefore be seen that the total realization was £250,112. The distribution was as follows: 6 per cent. debentures redeemed, £50,000; 5 per cent. debentures redeemed, £20,000; premium of 10 per cent. on the redemption of the above, £7000; and interest from Jan. 1, 1899, to Oct. 3, 1900, £7041. These amounts together made £84,041. Then there were the general expenses from Jan. 1, 1899, not chargeable against the profits that were paid to the Municipalities under the award. These were the Directors' fees, £671; Secretary's salary and office rent, £203; and office and general expenses, £359—the three items making £1233. The expenses of the arbitration amounted to £6476. The special remuneration of 5 per cent. of the award voted to the Directors and staff came to £10,967 less the amount undistributed and refunded £1387, or £9580. The expenses of liquidation were £203; and the Liquidators' remuneration was £250—together £453. Now as to the shareholders, they received a dividend to June 30 of £9600. The first return to them of £7 per share on 16,000 shares totalled to £112,000; and the second return of £1 10s. came to £24,000, or in all they had received £145,600. This statement accounted for £247,383. The balance in the Liquidators' hands was £2728. To meet the expenses to the close of liquidation, about £62 was set aside. Then there would be a third and final return of 3s. 4d. per share, making the total distribution to £8 13s. 4d. per £5 share; and this would absorb the remaining £2666—thus accounting for the total realization of £250,112. It was moved by Mr. R. H. Pringle, and seconded by D G. Hotson, that the account submitted by the Liquidators showing the manner in which the winding up had been conducted, and the property of the Company disposed of, be approved and adopted; that the Liquidators be requested forthwith to make to the Registrar of Joint-Stock Companies the required return as to the holding of the meeting with the view of the Company being in due course dissolved; and that the books, accounts, and documents of the Company be disposed of by the Liquidators in such manner as they thought fit. The motion was adopted; and a little further explanation ended the proceedings.

HEYWOOD AND MIDDLETON WATER BOARD.

The Engineer of the Heywood and Middleton Water Board (Mr. James Diggle) has issued his annual report to the members. It shows a deficiency of £1254 12s. 5d. on the year's working. To March 31 the total expenditure on the Ashworth Moor new reservoir was £16,578. There has been an additional expenditure of £8647 on the Naden higher reservoir enlargement; making the total £25,471. A sum of £1168 has been spent on mains, pipes, valves, &c.; and the expenditure on new offices has been brought up to £4435. During the past year, there has been an increase of 130 in the number of consumers and of six in that of meters in use; the present totals being: Consumers 13,592, and meters 380. There was an advance of £329 in the receipts for water supplied for domestic use, and a decrease of £288 in the takings for water sold per meter. In concluding the report, Mr Diggle says: "After making provision out of revenue for sinking funds, amounting in the whole to £2898, there remains a deficiency of £1254 upon the year's working. The falling off in the receipts for water consumed per meter in the Heywood district, the additional payment into sinking funds, and the high rate of interest on the bank overdraft are entirely responsible for the increased deficiency of £868 during the past year."

CHARGES FOR WATER AT PLYMOUTH.

Considerable discussion took place at the meeting of the Plymouth Borough Council on Monday last week, with reference to the proposal to increase the charges for water for trade supplies from 2d. to 3½d. per 1000 gallons, and also to make a charge of 6d. per 1000 gallons for water supplied to schools, public institutions, and Corporation Departments, hitherto supplied free. Mr. Bond repeated the warning given at the recent Fishing Feast (*ante*, p. 104) as to the necessity of making provision at an early date for the duplication of the pipe-line from the storage reservoir at Burrator to the town, and reminded the Council that, in connection with the water property, they had nothing in the nature of a reserve fund. As to the increased charges, he quoted statistics which showed that the actual cost of the water is 2·79d. per 1000 gallons, and that in other towns the charge by meter ranges very much higher than the 3½d. proposed to be charged in Plymouth. Many other towns, he said, also charged for the use of water for flushing sewers and watering the streets; and though a charge of this kind did not mean any profit to the town, the Committee felt that their books ought to show the whole income from the consumption of water. Mr. J. P. Brown, in moving that the question be referred back to the Committee for further consideration, contended that the study of economy in the use of water ought to come before the increase in the charges. The consumption in Plymouth was 48 gallons per head per day, whereas it ought not to be more than 30 gallons. The water which might be

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saved could be sold to outside customers. Such a municipal undertaking should not be carried on for the sake of profit in aid of the rates, but for the benefit of the whole community; and there should be an abundant supply of water at the lowest rates. The proposed increase in the charges was, he contended, wrong on sanitary grounds, and also in the interests of the manufacturers. Out of the £2400 of additional expenditure, the manufacturers were expected to pay £1800, which was equal to a rate of 1d. in the pound on the whole community. Several other members of the Council spoke against the increased charge, on the ground of its injustice to manufacturers; while Mr. Swain, the Chairman of the Sanitary Committee, opposed it because it would have the effect of decreasing the use of water for sanitary purposes and in public schools. On the other hand, it was argued that the higher charge might lead to very desirable economy. In the end, the amendment to refer the matter back was rejected, as was also a further amendment, the object of which was to exempt from charge water used for sanitary purposes. The Committee's recommendations were adopted.

SWADLINCOTE WATER SUPPLY.

The Milton Water-Works.

At the recent Meeting of the Association of Municipal and County Engineers at Swadlincote, Mr. T. Kidd, Surveyor and Water-Works Engineer to the Urban District Council, read a paper, as mentioned at the time, on the public works of the town. In the course thereof, he gave a long description of the water-works at Milton.

The works were designed by Messrs. G. & F. W. Hodson, to supply a population of 27,000 persons at 20 gallons per head per day, or 540,000 gallons in twelve hours. They are situated 132 feet above Ordnance datum, on the low-lying grounds extending from Milton village to the River Trent, 7 miles to the north of Swadlincote, and about 6 miles to the east of Burton-on-Trent. In adopting this site, which is about 620 yards from the river, very careful consideration was given to the question of the possibility of the pollution of the water by infiltration from the Trent. The preliminary borings proved most difficult, and occupied considerable time.

The selected site is stated to possess three distinct sources of supply. The first is from the gravel beds, which are in a measure supplied with water from the sandstone area on the high lands, which flows over the lip of the clay fault, proved by borings; the second is water from the bunter conglomerate formation underlying the clay, which is reached at 100 feet; and the third is the water of a stream which takes its rise on the slopes of the Pistern Hills, flows to the east of Milton, and falls into the Trent. The Milton Brook watershed is capable alone of yielding 2 to 2¼ million gallons of water per day; it carries but a scanty population, and is probably freer from chance of sewage pollution than any stream within many miles of the district. The first-named scheme was carried out; and thus saved the cost of impounding, which would not have been less than £100,000.

The works for abstracting the water are of the simplest nature, and consist of a series of Abyssinian tube-wells distributed over the site in such a manner as to intercept the upland waters, and filter tunnels through the adjoining lands. The low-lying ground of Milton consists principally of a stratum of gravel and sand, which was met with in the test bore-holes at depths varying from 16 to 23 feet below the surface and overlying the keuper marl. Into this bed of gravel, there are about 30 boreholes put down, each lined with 6½-inch external diameter wrought-iron artesian well boring-tubes with flush joints. Centrifugal pumps with 4-inch suction and delivery pipes, capable of discharging 200 gallons per minute, fitted with a temporary 4-inch suction-pipe extending to nearly the bottom of the hole, were provided, to pump from each boring after it was made to the full capacity of its yield (for 48 hours) continuously, or until such time as the water became perfectly bright, clear, and free from sand. The water so pumped was delivered into a properly constructed gauging-pond by means of wooden troughs; so that the yield from each could be made to flow into it for its proper measurement.

The well is 20 feet internal diameter, and is sunk through the gravel, which was found to be 23 feet in thickness, down to the red marl. The walls are 18 inches in thickness, built of brindled blue brick set in cement mortar, carried up 18 feet above the original level of the site, and surmounted by a cast-iron circular tank 24 feet in diameter and 9 feet deep inside, supported on six steel girders. A 12-inch cast-iron pumping-main, from the termination of the low-level delivery-pipe to the circular tank inlet, is connected also to the inlet of the softening-tanks. A 12-inch suction-pipe from the low-level pumps is carried to the bottom of the circular well, and fitted with one of Tangye's 12-inch foot-valves. Filter tunnels were formed by excavating close timbered trenches down to the marl; all undulations being cut through so as to allow a true gradient of 1 in 300 throughout.

The machinery is by Messrs. Tangye, Limited, of Birmingham, and has been designed with a special view to economy of coal consumption and the reduction of working expenses in every possible way, according to the best engineering practice of the day. The low-duty plant draws from the well and boreholes, and delivers into the hard-water tank. It consists of a 12-inch by 16-inch double-acting well pump, capable of delivering a maximum quantity of 30,000 gallons per hour, and two 8½-inch by 16-inch double-acting borehole pumps, each capable of delivering a maximum quantity of 15,000 gallons per hour. The speed of the pumps when the maximum quantities are being delivered is about 40 revolutions per minute; the total lift being about 51 feet, exclusive of friction. All three pumps deliver through one 12-inch main into the hard-water tank. There are two 10½-inch by 22-inch horizontal condensing engines (100 lbs. series), with steam-jacketed cylinders having short ports. The fly-wheels are 90 inches by 13 inches, and weigh 30 cwt. The hand-wheels of the governors are on the engine-house floor, to enable these engines to be started and stopped without going down into the basement.

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After being treated and softened, the water is pumped through a 12-inch rising main to the Woodville reservoir, by the high-duty plant, consisting of two compound horizontal condensing engines of the girder type, having a high-pressure cylinder 14¼ inches in diameter, and a low-pressure cylinder 23 inches in diameter by 36 inches stroke; both being steam-jacketed. Two sets of 9½-inch by 15-inch treble ram-pumps are provided, and when working together they are capable of delivering 45,000 gallons per hour to a vertical height of 420 feet through the rising main, or, including friction, against a total head of 535 feet when running at a maximum speed of 36 revolutions per minute.

The whole of the softening plant was supplied and fixed by Messrs. Mather and Platt, of Manchester; the Archbutt-Deeley process being employed. The apparatus is designed to treat 45,000 gallons of water per hour, or 540,000 gallons in twelve hours, which is easily softened and purified in four tanks 10½ feet deep, each having a working capacity of 27,000 gallons, being three-fourths of its depth. About 2½ feet of water and mud are allowed to remain when the water is drawn off; while a margin of 6 inches at the top is left in filling, which is done by means of a supply-pipe from the hard-water tank.

The buildings consist of an engine-house, 36 feet by 34 feet; a boiler-house, 41 feet by 22 feet; a fitting-shop, 16 feet by 12 feet; a capacious coal-store, 39 feet by 12 feet; and a softening-room, engineer's cottage, and lime and oil stores. They are raised above the highest known flood-level, and embanked all round. The engine chimney is 80 feet high, 3 ft. 6 in. wide inside at the bottom, and 2 ft. 6 in. at the top.

The reservoir, which has a capacity of upwards of a million gallons, is situate to the north-east of Woodville, at an elevation of 550 feet above Ordnance datum. It was owned by the Burton Union Rural Sanitary Authority until the amalgamation of Swadlincote, Gresley, Stanton, and Newhall into a united Local Government area; the effect of the amalgamation being that the Gresley Water-Works became vested in the Swadlincote Local Board, now the Swadlincote Urban District Council. An electro-mechanical apparatus for indicating and registering the varying levels of the water in the reservoir has been fixed, and has proved of great service. Telephones are provided between the Milton works, the author's office, and the Woodville reservoir.

The Joint Water Authority controlling the works, which cost altogether £30,502, is constituted of twelve members—eight from the Swadlincote District Council, and four from the Ashby-de-la-Zouch Council—by virtue of an agreement under which the Swadlincote district provided three-fourths and Ashby one-fourth of the capital expended. The allocation of the working expenses to be borne by each Authority is based upon the quantity of water that is consumed in the respective districts.

In the course of the discussion upon the paper, Mr. J. T. Eayrs (Birmingham) referred to the fact that the consumption of water in the district under the supervision of the author was about 10 gallons per head per day. This was, he said, a point which members should take note of, because when they had to do with the Local Government Board on the question of sewage disposal, the water consumption was always greatly over-estimated. He thought about 12 gallons per head per day were quite sufficient for domestic consumption. He did not know whether any manufacturers were using water in the district, and whether it was included in the 10 gallons. He had an instance of a place similar to the one under consideration, where the water supply was 8 gallons per head per day, and they had an effective supply, though the pressure certainly was not very great. There were no water-closets in the place. He also saw, in one of the papers read on the previous day, mention of a place where the water supply was only 7 gallons per head per day, which was exceptionally small. Mr. S. S. Platt (Rochdale) pointed out, with respect to the low water consumption, that probably they had a people not very luxurious as to baths and water-closets. Mr. G. T. Lynam (Burton-on-Trent) remarked that a consumption of 10 gallons per head per day was a very reasonable amount for domestic purposes; but it surely could not include any water for trade use.

Skipton Water Supply.—The Skipton Urban Council have decided to increase the present storage of water; and steps are to be taken to bring into the existing reservoir the water from the Eastby stream, the rights in which were acquired some years ago. Mr. G. H. Hill, of Manchester, is to advise the Council in the matter.

Oil v. Gas Lighting at Dungannon.—At the last meeting of the Dungannon District Council, the subject of lighting the town for the ensuing season, was considered. The Gas Company tendered to light the streets, including lamplighters' wages, for £150. The former cost of gas lighting was stated to be £134. The Sunlight Gas Company of Dublin submitted a scheme for laying down plant at a rent, or to become the property of the Council in three years. This scheme was found to work out at £105 a year for part oil, part gas. Mr. H. Newell, J.P., objected to the poorer parts of the town being left with oil-lamps, while the principal streets would have gas. It was ultimately decided to light the town with oil this year; the cost being estimated at £91 10s,

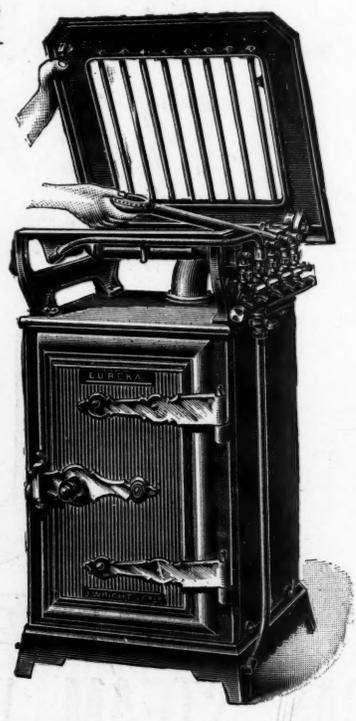
Extensions at the Meltham Gas-Works.—A report by Mr. J. H. Brearley to the Gas Committee of the Meltham District Council, on the condition of the gas-works and the probable requirements of the future, came before the latter body at a recent meeting. The adoption of the report was moved by Mr. J. H. Preston, who stated that Mr. Brearley suggested that in addition to the alterations and extensions which had been, and were being, carried out, it was also necessary to build two beds of retorts on the regenerative principle, and to put down a new gasholder. These were the main items they had to deal with. It had been urged in Committee that the present time was altogether inopportune for the carrying out of these suggestions; but he believed that they had confidence in the Engineer, and that his suggestions, if carried out, would ultimately more than counterbalance the proposed expenditure. Some of the members objected to the extensions, mainly on the ground of the expense; and the discussion on the matter gradually reached a very excited strain, which the peremptory rulings of the Chairman rather tended to intensify. In consequence, the meeting ended without coming to a decision.

"THERE IS NO BETTER THAN THE BEST."

THE

"EUREKA"

IS THE BEST.



NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

In an appendix to the annual accounts of the Edinburgh and Leith Gas Commission, prepared with his usual care by Mr. John S. Gibb, the Treasurer, it is stated that there were 166,289 tons of coal and 2862 tons of oil carbonized, at an average cost of 16s. 11·56d. per ton for coal. The oil is reckoned to be equivalent to 18,663 tons of coal. The gas made amounted to 1,917,548,000 cubic feet, a yield over all (taking oil at the equivalent given) of 10,367 cubic feet per ton. The gas sold amounted to 1,750,424,500 cubic feet, equal to 9464 cubic feet per ton, or 91·29 per cent. on the make. The gas accounted for amounted to 1,764,445,400 cubic feet, equal to 92·02 per cent. on the make; and the gas unaccounted for amounted to 153,102,600 cubic feet, equal to 7 98 per cent. on the make. The average illuminating power of the gas was 24·46 candles. The cost of coal was £141,043, equal to 1s. 5·65d. per 1000 cubic feet of gas made, and 1s. 7·18d. per 1000 cubic feet of gas sold. Oil carbonized cost £15,454, equal to 1·94d. per 1000 cubic feet of gas made, and 2·10d. per 1000 cubic feet of gas sold. Purification and sundries cost £10,128, equal to 1s. 1·14d. per ton of coal carbonized, 1·27d. per 1000 cubic feet of gas made, and 1·38d. per 1000 cubic feet of gas sold. Salaries amounted to £2688, equal to 3·49d. per ton of coal, 0·34d. per 1000 cubic feet of gas made, and 0·37d. per 1000 cubic feet of gas sold. Wages amounted to £47,467, equal to 5s. 1·60d. per ton of coal, 5·94d. per 1000 cubic feet of gas made, and 6·46d. per 1000 cubic feet of gas sold. Repairs and maintenance cost £11,204, equal to 1s. 2·54d. per ton of coal, 1·40d. per 1000 cubic feet of gas made, and 1·52d. per 1000 cubic feet of gas sold. The total cost of the manufacture of gas was £227,985, equal to 24s. 7·84d. per ton of coal, 2s. 4·54d. per 1000 cubic feet of gas made, and 2s. 7·01d. per 1000 cubic feet of gas sold. The total cost of the distribution of gas was £23,197, equal to 2s. 6·10d. per ton of coal, 2·90d. per 1000 cubic feet of gas made, and 3·16d. per 1000 cubic feet of gas sold. Management cost £9724, equal to 1s. 0·62d. per ton of coal carbonized, 1·22d. per 1000 cubic feet of gas made, and 1·32d. per 1000 cubic feet of gas sold. The gross cost of the gas was £281,244, equal to 30s. 4·95d. per ton of coal, 2s. 11·20d. per 1000 cubic feet of gas made, and 3s. 2·26d. per 1000 cubic feet of gas sold. There was received for coke £21,482, equal to 2s. 3·88d. per ton of coal carbonized, 2·69d. per 1000 cubic feet of gas made, and 2·92d. per 1000 cubic feet of gas sold. There was received for tar £20,269, equal to 2s. 2·30d. per ton of coal, 2·54d. per 1000 cubic feet of gas made, and 2·76d. per 1000 cubic feet of gas sold. These and other receipts reduced the net cost of gas to £238,687, equal to 25s. 9·73d. per ton of coal carbonized, 2s. 5·87d. per 1000 cubic feet of gas made, and 2s. 8·47d. per 1000 cubic feet of gas sold. The revenue from gas amounted to £280,843, equal to 30s. 4·43d. per ton of coal carbonized, 2s. 11·15d. per 1000 cubic feet of gas made, and 3s. 2·20d. per 1000 cubic feet of gas sold. The gross profit amounted to £42,156, equal to 4s. 6·70d. per ton of coal carbonized, 5·28d. per 1000 cubic feet of gas made, and 5·73d. per 1000 cubic feet of gas sold. Annuities (including £1511 9s. 6d. redeemed) amount to £35,200, equal to 3s. 9·68d. per ton of coal carbonized, 4·41d. per 1000 cubic feet of gas made, and 4·79d. per 1000 cubic feet of gas sold. Interest on money borrowed amounted to £18,493, equal to 2s. per ton of coal, 2·31d. per 1000 cubic feet of gas made, and 2·51d. per 1000 cubic feet of gas sold.

The gas-works at Stromness have been exposed for sale by public auction, but have failed to find a purchaser at the upset price of £750. There is a probability of the works being closed.

The Edinburgh and District Water Trust have now obtained a Provisional Order entitling them to raise additional capital to the amount of £250,000, and to an extension of time for five years, for the completion of their Talla water scheme. The capital already authorized is £950,000. At a recent meeting of the Trust, Mr. Wood, the Convener of the Finance Committee, presented the accounts for the past year. He said that the results of the year's transactions, having regard to the increase of capital expenditure in connection with the Talla scheme, were very satisfactory. The estimates for the year showed an estimated deficit as against revenue of £3411, but the actual deficit was only £1645. The revenue for the year from rates amounted to £105,324, being £655 above the estimate. The expenditure for the year came to £110,106, being £1204 under the estimate. Notwithstanding the increase of expenditure and the small deficit of the year, the accumulated balance in hand amounted to £32,819; so that there would be no need to increase the water-rates in the immediate future. During the year, there had been a capital expenditure upon the Talla works of £72,547; and in connection with other works, £10,528—making a total capital expenditure for the year of £83,075. It was matter of regret and concern to all that the work done and the expenditure on the new works had been so limited; but, as the Trustees were aware, various causes had impeded the progress of the works. It was confidently expected, however, that much greater headway would be made in the present year. The debt of the Trust had considerably increased during the year. The mortgage debt at Whitsunday, 1900, amounted to £1,186,261, and at Whitsunday, 1901, to £1,400,606, showing that £214,345 of new money had been borrowed during the year, which was obtained at 3 and 3¼ per cent. The accounts showed, however, that the Trustees had at their credit at Whitsunday last the following sums: On deposit receipt with bank, £128,000; on account current with bank, £9193; and on loan to the city, £60,500—in all, £197,693, from which there fell to be deducted as due to revenue, £32,819, leaving of unexpended capital the sum of £164,874. The total amount borrowed by the Trustees under their several Acts of Parliament was £1,617,904, of which there had been redeemed by means of the sinking fund, £217,299, which left outstanding at Whitsunday last a mortgage debt of £1,400,606. The collection of the rates had been efficiently carried out. Of a total assessment of £105,913 for the past year, there was collected the sum of £105,200, equal to 99·33 per cent. The sum abated amounted to £375, equal to 0·35 per cent.; the amount irrecoverable was £61, equal to 0·06 per cent.; and the arrears carried forward to the current year were £277, or 0·26 per cent.

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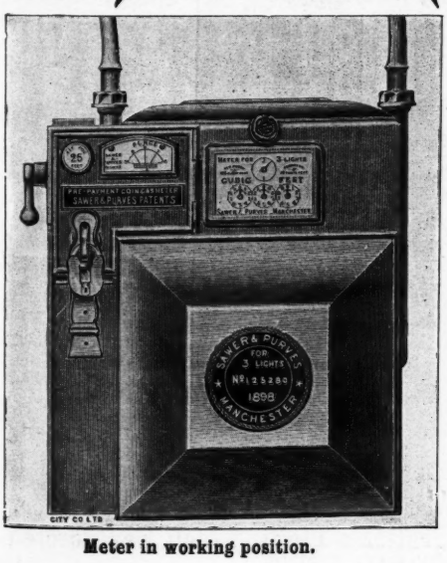

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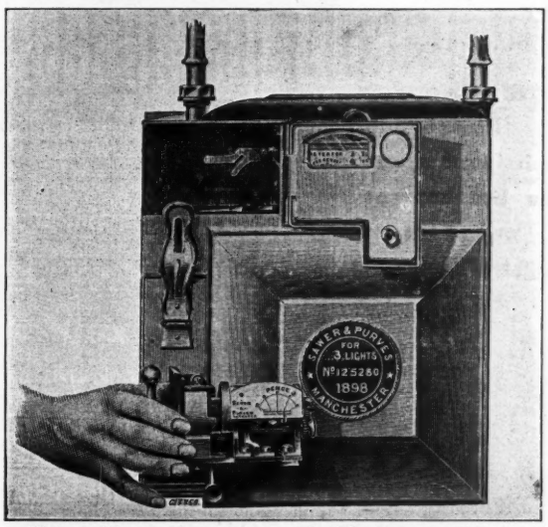

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The Glasgow Corporation Gas Committee have just paid the North British and Caledonian Railway Companies and Major-General David Blair Lockhart a sum of £5734 12s., the price for a portion of ground and way-leave at Germiston, acquired by the Corporation for the construction of the branch lines of those Companies into the Provan Gas-Works, including interest and expenses. The same Committee have also paid a sum of £3557 17s. 9d. for a portion of ground at Blochairn acquired by the Corporation, on behalf of the North British Railway Company, from the Steel Company of Scotland, Limited, for the Railway Company's line into the new works.

At a meeting of the Glasgow Corporation on Thursday, it was reported by the Gas Committee that at a meeting of a Special Sub-Committee as to the supply of gas to the burgh of Milngavie there was read a letter from the Secretary of the Milngavie Gas Company, stating that he was instructed to make an offer *re* the sale of the Company's undertaking to the Corporation—viz., to sell the pipes and meters alone belonging to the Company, along with the goodwill of the Company, for £3800; or, alternatively, to sell the whole undertaking for £4500, all accounts to be collected by the Company, and debts due by the Company paid by them, to date of entry. The Committee unanimously recommended that the offer to sell the Company's whole undertaking to the Corporation at the price of £4500 be accepted, provided the Town Council of Milngavie undertook to give, so far as they could competently do so, their consent and support to an application to Parliament, and subject also to an agreement being executed between the Company and the Corporation, containing, *inter alia*, the following terms and conditions: (1) That the Corporation's entry to the Company's undertaking shall be as at the date on which the Bill confirming the agreement receives the Royal Assent, when the price shall be payable, with interest at 5 per cent. per annum from said date till paid. (2) That the consent of Parliament is obtained to include the Company's present area of supply, with such part, if any, of the immediately adjoining district, over which the Corporation may think it proper to seek power to supply gas, within, and as part of the supplementary supply district referred to in section 3 of the Glasgow Corporation Gas Act, 1891, and within which district a differential rate may be charged by the Corporation, not at any time exceeding the maximum price of 4s. 7d. per 1000 cubic feet, fixed by section 67 of the Corporation Gas Act, 1869. (3) That any conveyance requiring to be granted by the Company in favour of the Corporation shall be executed and delivered to the Corporation upon payment of the price and interest. (4) That the agreement shall only be operative and binding upon the parties in the event of its being confirmed by Parliament, and shall also be subject to such alterations as Parliament may think fit to make. The Committee recommend that, in the event of the Corporation approving of the purchase of the Company's undertaking on the terms indicated, an application be made to Parliament next session for the powers necessary to carry the proposed arrangement into effect. The Gas Committee approve of this minute subject to the amendment—"That the price to be offered to the Company for the sale of their whole undertaking to the Corporation be £4000 instead of £4500."

In the event of the sale of the works, goodwill, &c., of the Milngavie Gas Company to the Glasgow Corporation being finally effected, the city authorities will have the gas supply in their own hands for many miles around in every direction, with the exception of Bailieston and Cambuslang, both of which lie in an easterly direction from the city. Renfrew, in the west, did apply at one time to Glasgow offering their works; but the proposal never came to a head, and it has gone on for some years as an independent concern, having, in a sense, obtained a new lease of existence. Rutherglen, which is near to Cambuslang, was taken over by Glasgow many years ago; and the same is true of Pollokshaws, Hillhead, Partick, and Maryhill. Old Kilpatrick has been acquired for some years, and Clydebank has almost always had its gas from Glasgow.

The Convener of the Gas Committee of the Corporation of Perth this week submitted to a meeting of the Committee a letter received from the Under Secretary for Scotland to the Gas Manager, with reference to some defects on the sulphate plant; and also a letter from the Gas Manager stating that, so far as practicable just now, the instructions had been carried out, certain alterations having been made. It was remitted to the Manager to report as to what improvements he would suggest in the sulphate plant.

At a meeting of the Irvine Town Council on the 2nd inst., the Water Superintendent reported that, owing to the rainfall for the past three months only amounting to 7·95 inches, the water in the reservoir, which supplies Saltcoats, Stevenston, and Kilwinning, as well as Irvine, had fallen 12 feet 6 inches below zero. It thus only contained a few days' supply at the present rate of consumption—about 2½ million gallons per day. Mr. Colvin suggested that they should cut down the supply to large works, including Nobel's Dynamite Factory and the Chemical Works, to two or three hours per day. This, however, did not receive any support, and it was finally agreed to ask the ministers in town to caution their congregations as to waste of water, and to leave any other arrangements in the hands of the Provost and Superintendent. This resolution is characteristically Scotch. I have not learned whether it had effect or not; but I am inclined to think that the "not" would have it. I am afraid that even in my country the closing of a valve would have more effect in checking the consumption of water than would the opening of a clergyman's mouth.

Down to the end of last week, fears were entertained that the water supply of some towns would give out before the winter rains arrived. There is now, I imagine, no fear of that. Last Saturday was a day of very heavy rain over the whole of Scotland, accompanied in many places by severe thunderstorms. The quantity of rain which fell was enormous, amounting to from ¾ inch to 1½ inches. There have been copious showers since. Even were a drought of several weeks' duration now to set in, it would not tell upon water supplies this season, as the reservoirs are now again well filled and able to sustain a heavier draw upon them than usual.

Our contemporary the "Engineer" learns that gas is about to be made from peat fuel in Canada.

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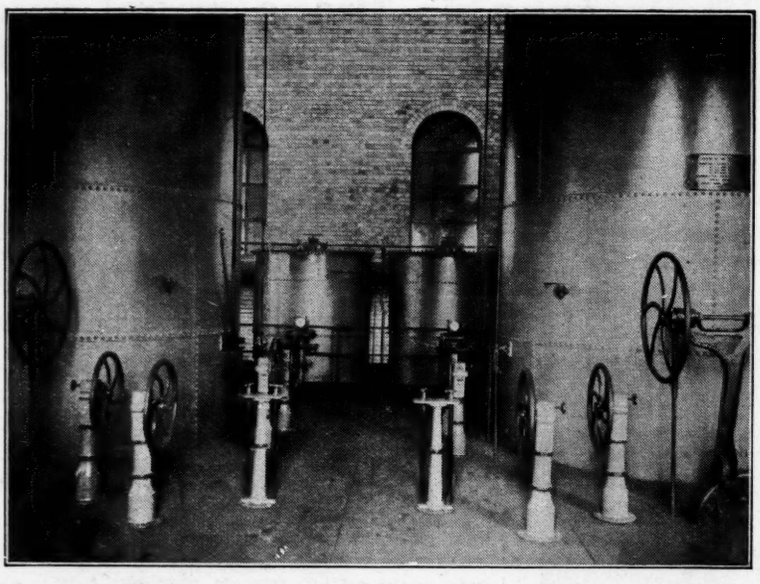

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 17.

Sulphate of Ammonia.—The market has been rather quiet during the week, and has not presented any special feature. At the east coast ports, the demand has been somewhat slow, and prices have consequently been barely maintained. There are indications, however, that there are orders which may be covered before the end of the month; and these are likely to bring prices back to last week's level. Quotations for prompt delivery are, at the close, £10 11s. 3d. per ton f.o.b. Leith, £10 7s. 6d. to £10 8s. 9d. f.o.b. Hull, and £10 12s. 6d. per ton, Beckton terms, London. In Liverpool, the price is very steady at £10 13s. 9d. per ton f.o.b. For forward delivery extending into next year, Scotch makers have not modified their ideas of £10 17s. 6d. f.o.b. Leith; while for delivery up to the end of the year, London quotations remain at £10 15s., Beckton terms.

Nitrate of Soda is firm at 8s. 9d. to 9s. per cwt., according to quality.

LONDON, *Aug.* 17.

Tar Products.—There is very little fresh to report; business remaining in a very stagnant condition. 90 per cent. benzol has been sold at 9½d. per gallon, prompt shipment; but the principal inquiry is for next year—it being generally believed that some large sales have been made for the purpose of enriching gas, which it will be necessary to cover in later. 50 to 90 per cent. is not inquired for, and does not seem to interest consumers. Unless the aniline trade improves, this quality will undoubtedly be very dull for some time to come. Anthracene is entirely neglected; and there is nothing to report. Crude carbolic is decidedly weaker. There are sellers of 60's at 2s.; and, in fact, one small sale is reported at 1s. 11½d.; but this was for forward delivery. In all probability, however, prices will be still easier, as several makers are anxious to sell for forward delivery. Crystals remain in the same position. The makers are still sellers of 39-40's at 8d. per lb.; but consumers do not appear anxious to purchase. Pitch is very firm for delivery in South Wales, especially for prompt. This is doubtless owing to the fact that the warm weather prevents shipment, which has caused consumers to run short of stock. Tar oils are decidedly weaker. Stocks of creosote are undoubtedly heavy, while the demand does not show signs of increase. Solvent is still very quiet. Makers appear to have made up their minds to reduce quotations, though it is doubtful whether this will lead to business, as there is no Continental demand. Tar continues to be strongly competed for; and the prices paid for some contracts recently let are out of all proportion to the values ruling for products. As there does not seem much sign of improvement in same, probably some of the distillers will regret having unnecessarily raised the values of the raw material.

The average values obtaining during the week are: Tar, 14s. 6d. to 18s. Pitch, east coast, 30s. 6d. to 31s.; west coast, 28s. to 28s. 6d. Benzol, 90's, 9¼d. to 9½d.; 50's, 9d. Toluol, 10¼d. Crude naphtha, 4¼d. Solvent naphtha, 1s. Heavy naphtha, 10d. to 11d. Creosote, 1d. to 1¼d. Heavy oils, 2d. Carbolic acid, 60's, 2s. Naphthalene, 60s. to 70s.; salts, 30s. to 40s. Anthracene, "A," 2¼d. to 2½d.; "B," unsaleable.

Sulphate of Ammonia.—The market is quiet; and there is really no business to report. Beckton remains in the same position. The Gaslight and Coke Company are still sellers at £10 15s.; but there are no buyers at this price. As regards Hull, there does not seem to be any demand for early shipment. Consumers will not pay more than £10 7s. 6d. for August-September; but in all probability they would be buyers for October-December at £10 10s. Buyers at Leith will not pay more than £10 10s.; and, in fact, there would be difficulty in placing any quantity at this price. The demand continues good for shipment from Liverpool; and the value may be taken as £10 12s. 6d. There seems to be a shortness of supplies at this port, which will account for the values being well maintained.

COAL TRADE REPORTS.

Lancashire Coal Trade.—Little or no change is noticeable in the position generally throughout the coal trade of this district. Perhaps there has been slightly more stirring in house-fire coals during the past week; but nothing to affect the market, which remains extremely quiet, with ample supplies of all descriptions of round coal offering, and considerable stocks accumulating, notwithstanding many of the pits are not running more than two, and the bulk of them three to four days per week. There is, of course, a good deal of irregularity in the prices at which special clearance lots can be picked up in the open market; but the list rates remain unaltered, the basis for house coals, which are now settled at the minimum for the year, remaining at 15s. for best Wigan Arley, 13s. to 13s. 6d. for Pemberton four feet and seconds Arley, and 11s. to 11s. 6d. for common house coal at the pit. Steam and forge coals are rather hanging on the market, with prices perhaps a shade easier, ranging from 8s. 6d. to 9s. at the pit; while surplus supplies are being pushed for shipment at exceedingly low-cut figures, ranging from as low as 9s. 6d. to 10s., and up to 10s. 3d. and 10s. 6d. quoted for better qualities delivered at Mersey Ports and the Manchester Ship Canal. Engine fuel remains steady; but there is perhaps not quite the firmness recently noticeable. A good deal of slack is just now being thrown on the market by holiday stoppages of mills and works; and heavy stocks are accumulating in some outside districts. Lancashire collieries are still moving away their present limited output of slack fairly well, and the better qualities are firm at about 8s. per ton, with common sorts ranging from 6s. upwards, according to quality. There is, however, slack in other districts offering from as low as 3s. at the pit. Coke is in fairly good demand, with prices still tending to harden. For good washed Lancashire furnace coke, from 13s. to 14s. is now being quoted, good washed Yorkshire furnace cokes average 12s. to 12s. 6d., and the best unwashed sorts 11s. 6d. to 12s. at the ovens. Good Lancashire foundry coke is firm at about 24s. to 25s. per ton at the ovens.

C. & W. WALKER, Ltd.

Midland Iron-Works,

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Weck's Patent CENTRE-VALVE

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PERFECTLY TIGHT UNDER EVERY EXTREME OF HEAT IOR COLD.

THE ONLY ABSOLUTELY RELIABLE CENTRE-VALVE IN THE MARKET.

Northern Coal Trade.—The demand for coals for early delivery has increased during the last few days, and that more especially for gas coals, which are in very strong requirement for the season. Best Northumbrian steam coals are steady—the collieries having very full work. The price is about 13s. 6d. per ton, f.o.b., second-class steams are 12s. 6d. per ton, and steam smalls 5s. 6d. There is a fair trade in the latter. In the gas coal trade, there is an improved demand for home use; and thus the shipments to the South are increasing. There is also a pressing demand for best Durham gas coals for export; shippers wishing to get as much as possible away during the time the rebate of the duty is allowed. The output is thus well taken up; and there is some pressure for early supplies. For best Durham gas coals, 10s. 9d. to 11s. 3d. per ton f.o.b. is asked for occasional cargoes. Coke is steady at from 17s. 6d. to 18s. per ton f.o.b. for best Durham kinds for export, 15s. 6d. to 16s. for furnace coke on Teesside, and gas coke at from 11s. 9d. to 12s. per ton, f.o.b.

Scotch Coal Trade.—There is a steady tone in the market, with no appearance of change; and neither is there likely to be any until it is known how the wages question is to be determined. The prices quoted are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. to 11s., splint 10s. to 10s. 3d. The shipments for the week amounted to 226,409 tons—a decrease of 355 tons upon the previous week, and of 4248 tons upon the corresponding week of last year. For the year to date, the total shipments have been 5,797,622 tons—a decrease upon the corresponding period of last year of 587,748 tons.

Settlement of the Lighting Difficulty at Woking.—The difficulty which arose some weeks ago between the Woking Urban District Council and the Electric Supply Company, consequent upon the former failing to give the latter notice to terminate their contract, to which reference has already been made in the "JOURNAL," has been amicably settled. Negotiations, conducted in a conciliatory spirit on both sides, have lately been in progress. The Company offered to settle the matter on payment of 60 guineas, and the Lighting Committee of the Council recommended that the offer should be accepted. The Council, at their meeting last Wednesday, adopted the Committee's report. The Company will now disconnect their cables at the Council's expense; and the standards will be handed over without delay to the Gas Company, who have, it may be remembered, secured the contract for the public lighting.

Stafford Gas-Works in Danger.—The Stafford Gas-Works last Thursday had a narrow escape from a serious explosion, which was fortunately averted by the prompt turnout of the Fire Brigade, and a good supply of water being available. It seems that one of the workmen, going on duty at two o'clock in the morning, found the oil-stores, in which there was a quantity of cotton waste, on fire. He at once gave the alarm, and the Fire Brigade were soon on the spot. They found the waste well alight, but they soon got the fire under. Besides the cotton waste, there was a large quantity of petroleum, turpentine, wood, naphtha, &c., stored in the building; and before the fire could be checked it had approached so close as to heat it, and make the liquid bubble. The commencement of the fire is said to be due to spontaneous combustion of the cotton waste; and the damage is estimated at from £100 to £150, which is covered by insurance.

The offices of the Ascot District and Whitchurch (Hants) Gas Companies, as well as those of Messrs. Schultz and Comins, have been removed to No. 50, Cannon Street, E.C.

The Lytham Town Commissioners have just placed an order with Messrs. Jonas Drake and Son for the erection of four through benches of retorts, fitted up complete, at their gas-works.

Mr. Hugh Strathearn and Mr. W. D. Helps, Managers respectively of the Glasgow and Leeds branches of Messrs. James Milne and Son, Limited, of Edinburgh, have been elected Directors of the Company.

The following tenders have been accepted in connection with the new water scheme for Battle: Mains, Messrs. John Aird and Sons, £1937 12s.; boilers, Galloways, Limited, £350; and pumping plant, Messrs. C. Isler and Co. £1147.

It was decided by the Penzance Town Council on Thursday last to erect a Kitson lamp of 1000-candle power as an experiment in the direction of the improved lighting of the town. Alderman Carne, in supporting the recommendation, said he thought the lamp was worth a trial. The town was not mad on electricity.

Mr. A. E. Podmore—who was for many years with the old firm of Henry Greene and Sons, of Cannon Street, E.C., and on the conversion of the concern into a Limited Company, under the style of H. Greene and Sons, Limited, was appointed General Manager (a position he held for three years)—has commenced business in the same line on his own account at No. 25A, Hatton Garden.

The Local Government Board have declined to sanction the borrowing of £8448 for purposes of water supply for a portion of Chapel-en-le-Frith, Chinley, and Bugsworth; their objection being to the lease of the Town End Water-Works as part of the scheme. They have asked the Chapel-en-le-Frith Rural District Council to furnish them with a complete report on the condition of the works by a competent valuer. This, it is stated, means an entire reconsideration of the whole water question of Chapel-en-le-Frith.

At the second annual ironmongery and hardware trades exhibition, which was opened in the Agricultural Hall, Islington, last Wednesday, the Welsbach Incandescent Gaslight Company showed a large selection of incandescent gas accessories, including burners, chandeliers, and brackets; and the Acetylene Corporation had an interesting display of acetylene gas generators, scrubbers, purifiers, and accessories. Messrs. Falk, Stadelmann, and Co., the manufacturers of the "Veritas" lamps, furnished a good show of acetylene lamps and fittings.

We have received from Messrs. J. Truscott and Son, of Suffolk Lane, Cannon Street, E.C., a copy of the summer issue of the "Engineering Price List." This work has been established eight years, during which time it has become recognized as a publication specially suitable for shippers and exporters of machinery to use as their catalogue. To foreign buyers it furnishes a complete record of the most recent engineering productions, and affords them a means of acquaintance with most of the prominent and reliable firms. A valuable feature of the book is its thoroughly comprehensive and carefully classified general index, which is printed in English, French, and Spanish; thus enhancing the utility of the list in foreign countries, where in many cases an English catalogue is practically useless. The book is strongly bound, for hanging up in the counting-house or drawing-office.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

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ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

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"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

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Old Broad Street,
"Volcanism, London." London, E.C.

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Offices: Commercial Buildings, LEEDS. Correspondence invited.

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H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.

19, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "LUMINOSITY."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.

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Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

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Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.

Information and Handbook on application,
70, CHANCERY LANE, LONDON, W.C.

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BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

OXIDE OF IRON OF FINEST QUALITY.

BALE'S Special Fire Cement should be used to keep Retorts, Furnaces, &c., in good repair during the heavy Winter Work.

Send for full Particulars to
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Telegrams: "BOGORE, LONDON."
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JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
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For all Joints in connection with Oil Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
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BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.

For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."

Largest Practice and most Up-to-Date Works in Britain.

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SULPHURIC ACID for Sale.

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TO GAS AND WATER OFFICIALS.

HIGH-CLASS CYCLES at Reasonable and LOW PRICES. Guaranteed and sent on approval. For Cash or Gradual Payments. Catalogue post free. Old Machines Exchanged or Repaired.
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REQUIRED, a Situation as Assistant on a Gas-Works. Served Articles under a good Engineer for 4½ Years.
Apply to G. CHURCH, Gas-Works, CHICHESTER.

A YOUNG Gentleman seeks position as CHEMIST to a firm of Chemical Manufacturers. Good German. Can Invest. Satisfactory References.
Address No. 3735, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Advertiser (age 21), a Situation as METER FIXER, FITTER, INDEX TAKER, &c. Well up in Automatic Work.
Apply to P.M., care of Mr. Richardson, 18, Nesbit Street, Homerton, LONDON.

WANTED, an Engagement as Manager, or as ASSISTANT on a large Works (Home and Foreign Experience). Careful and attentive to Duties. Good References. No objection to go abroad. Moderate Salary.
Address No. 3727, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a young Man, a Situation as WORKING MANAGER in a Gas-Works where the annual make is from 8 to 20 million Cubic Feet. Is practically experienced in Carbonizing and the General Routine of Gas-Works.
Address No. 3731, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SITUATION wanted, by a Smart, Active Man, as METER INSPECTOR and GAS COLLECTOR. Can Plane, Shape, Drill, lay Services, &c. Has a fair knowledge of the routine of a Gas-Works. Would be of great assistance to a Manager in a medium-sized Works. Thirteen years' character from one Company. Age 38. Abstainer and Non-Smoker.
Address No. 3732, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

JUNIOR Clerk wanted in Gas and Water Company's Office (about 25 miles from London). One accustomed to the work, and a Shorthand Writer preferred.
Write, stating Experience, Salary required, &c., to "GAS," care of Gould's Advertising Offices, 54, NEW OXFORD STREET.

WANTED, at once, a steady, reliable Man as STOKER. Must be a good Shovel Charger, and used to Engine and Exhauster. Wages, 35s. per week of seven days, with a Week's Holiday every Year.
Apply to S. BAILK, Manager, Gas-Works, SUNBURY-ON-THAMES.

REQUIRED, by the Croydon Commercial Gas Company, a good DRAUGHTSMAN. None need apply who has not had considerable experience in Gas-Works Extensions.
Applications, stating Qualifications, Age, Salary required, &c., to be addressed to Mr. J. W. HELPS, Gas-Works, CROYDON.

WANTED, at once, a good leading STOKER, used to Shovel Charging, Engine and Exhauster. Preference given to a Married Man, with knowledge of Regenerative Firing. Wages 28s. per week. Permanency to a steady, sober Man.
Apply, with Reference, to CLARK JEFFERY, Manager, Gas-Works, Ware, HERTS.

WANTED, a competent Gas-Fitter for Internal Work—Iron and Compo., Slot Meters and Cookers—and to make himself generally useful in a Gas-Works.
State Age and Wages required, and enclose *copies* of Three References, to
A. G. BATES,
Secretary and Manager.
Gas Offices, Wokingham.

MECHANICAL Engineer Wanted as MANAGER, with experience in the Gas Branch preferred.
Send application, with short Statement of Experience. *Copies* of Certificates, Salary expected, and when free, to A. B. C. 129, care of DEACON'S ADVERTISING OFFICES, Leadenhall Street, LONDON. Gentlemen without practical experience as Manager or Assistant need not apply.

WANTED, at once, a leading Stoker and an UNDER STOKER used to Regenerator Settings, Steam and Gas Engines and Exhausters. Eight-Hour Shifts Six Months, and Twelve-Hour Shifts Six Months; the under Stoker to work in Yard during Summer Months. Married men preferred. Good Wages to steady Men.
Apply, with References, to H. WIMHURST, Manager, Gas-Works, SLEAFORD.

FOREMAN RETORT SETTER.

WANTED, by the Reading Gas Com- pany, an experienced and competent FOREMAN RETORT SETTER. He must be well up in Retort-Settings and Regenerative Furnaces, and be able to read Plans of same, and take charge of, and regulate, the Settings when in action. Age about 35.
Apply, stating Wages required, with *copies* of three Testimonials, to the undersigned on or before Aug. 28, 1901.
HERBERT E. S. BAKER,
Engineer and Manager.
Gas-Works, Reading.

EXPERIENCED Conveyor Erecter wanted.
Apply to BABCOCK AND WILCOX, 30, Farringdon Street, LONDON.

BOROUGH OF BRIGHOUSE.

CARBONIZING FOREMEN.

THE Brighouse Corporation Gas Com- mittee require the services of two experienced CARBONIZING FOREMEN at the Mill Lane Station. Preference will be given to Men used to Inclined Retorts and Regenerator Furnaces. Standing Wages 42s. per week.
Applications, stating Age and Experience, accompanied by one recent Testimonial, to be sent to W. L. SUTCLIFFE, Manager, Gas-Works, BRIGHOUSE, endorsed "Foreman," on or before Saturday, Aug. 31, 1901.

COUNTY BOROUGH OF WEST BROMWICH.
(GAS DEPARTMENT.)

THE Gas Committee of this Corporation require an ENGINEER to take charge of the Manufacturing and Distributing Departments of their Undertaking.
The person appointed to the position will be required to devote the whole of his time to the duties; and he must be fully competent to design and carry out any alterations and extensions of Works and Plant.
Salary £450 per annum.
Applications, accompanied by *copies* of three recent Testimonials, to be sent to the Chairman of the Gas Committee, Town Hall, not later than Tuesday, the 3rd of September next.
Canvassing members of the Committee, either direct'y or indirectly, will be deemed to be a disqualification.
By order,
THOS. HUDSON,
Secretary.
Town Hall, West Bromwich,
Aug. 9, 1901.

WOKINGHAM CORPORATION GAS-WORKS.

FOR SALE—A 6-inch Station Governor by the Gas-Meter Company, with 6-inch Connection, Valves, Bye-pass, with Balance Weights. Replacing with a 10-inch Governor. Can be seen at Work. For Price, &c., apply, to
A. G. BATES,
Secretary and Manager.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
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TO BE SOLD—
GASHOLDER (with Wrought-Iron Tank), 30 ft. by 12 ft. Cable Guided. New in 1895.
CENTRE-VALVE, 15 in. diameter, by Walker, for Four Purifiers.
Four PURIFIERS, 10 feet square, in line, with Planed Joints, Walker Centre-Valve, Covers, and Traversing Crab Lifting Gear. Will be refixed equal to new.
Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

HAWORTH URBAN DISTRICT COUNCIL.

THE above Council are prepared to re- ceive TENDERS for screened and unscreened GAS COAL, delivered on Rails at the Midland Railway Station, Haworth, for the period ending July 31, 1902. The number of Tons required is 2000.
Tenders to be forwarded to me, endorsed "Coal Tender," not later than Aug. 28, 1901.
WM. ROBERTSHAW,
Clerk.
North Street, Keighley.

URBAN DISTRICT COUNCIL OF ELLESMERE.

ERECTION OF RETORT-BENCH AT GAS-WORKS.

THE Urban District Council of Elles- mere invite TENDERS for the erection at their Gas-Works, at Ellesmere, of a RETORT-BENCH of three Arches, three Regenerative Furnaces, and fifteen Ω Retorts, with Furnace Fittings, Bench Mountings, Subway, and Chimney.
The work to be carried out in accordance with Plans which can be seen, and Specification which can be obtained, on application to me, the undersigned.
Sealed Tenders, endorsed "Tender for Retort-Bench," to be sent to me not later than Wednesday, the 4th of September, 1901.
R. E. LLOYD,
Clerk of the Council.
1, Willow Street, Ellesmere,
Aug. 6, 1901.

WINSFORD URBAN DISTRICT COUNCIL.

THE above Council are prepared to receive TENDERS for the supply of the following CASTINGS required as GAS-MAINS:—

60 9-inch	Cast-Iron S. & S.	PIPES.	
500 6-inch	do.	do.	do.
140 3-inch	do.	do.	do.

To be Plain Joints for Forster Rings, and Coated and Tested. The 9-inch and 6-inch to be Vertical Castings.
Some IRREGULARS, and also 60 9-inch, 500 6-inch, and 140 3-inch VULCANIZED INDIA-RUBBER RINGS for the above Pipes are required.
The whole to be delivered in four weeks from date of order at the Cheshire Lines Station, Winsford, or the Over & Wharton Station of the L. & N. W. Railway.
Forms of Tender can be had on application to the Gas Manager, Mr. F. Sidwell, or the undersigned, to whom sealed Tenders are to be delivered, endorsed "Tenders for Castings," not later than three p.m. on Tuesday, the 27th of August, 1901.
Dated this 14th day of August, 1901.
JNO. H. COOKE,
Clerk to the Council.
Winsford, Cheshire.

TENDERS FOR COAL.

THE Directors of the Holyhead and North Wales Gas and Water Corporation, Limited, are prepared to receive TENDERS for the supply and delivery of COALS to their various Works for the ensuing Year.
Full Particulars and Forms of Tender may be had on application to the undersigned, to whom sealed Tenders, endorsed "Tender for Coal," must be sent not later than Twelve noon, Wednesday, Aug. 21, 1901.
GEORGE E. SAVILLE,
Managing Director.
Penmaenmawr,
July 9, 1901.

CORPORATION OF WARRINGTON.

THE Gas Committee of the above are prepared to receive TENDERS for the supplying and fixing of a WASHER-SCRUBBER to pass 1½ million cubic feet per day.
Also for the PURCHASE of a disused KIRKHAM WASHER, to pass 1 million cubic feet per day.
Full Particulars can be obtained from Mr. W. S. Haddock, the Gas Engineer.
Tenders to be sent not later than the 29th inst.
F. TAYLOR,
Secretary.
Gas Offices, Mersey Street, Warrington,
Aug. 9, 1901.

CONTRACT FOR TAR AND SULPHATE OF AMMONIA.

THE Inverness Gas Commissioners are prepared to receive OFFERS for TAR and SULPHATE of AMMONIA produced at their Works, up to the 15th of May, 1902.
Particulars may be had by applying to the Manager at the Gas-Works.
Tenders, endorsed and addressed to Kenneth Macdonald, Esq., Clerk to the Commissioners, will be received up to Monday, the 26th current.
The Commissioners do not bind themselves to accept the highest or any Tender.
Gas-Works, Inverness,
Aug. 15, 1901.

THE Directors of the Sutton, South- coates, and Drypool Gas Company, Hull, invite TENDERS for the supply of 16,000 Tons of Best SILKSTONE GAS COAL, stating price for each of the following descriptions: Screened, Unscreened, and Cobbles, for delivery during the Year ending the 30th of June, 1902, in North-Eastern Railway Company's Waggons into this Company's Siding, Dansom Lane, Hull.
The lowest or any Tender will not necessarily be accepted.
Tenders to be sent addressed to the undersigned before Twelve o'clock noon, on Tuesday, the 27th of August, 1901, marked "Tender for Coal."
By order,
DAVID WOOD,
Secretary.
Offices: St. Mark's Street,
Hull, Aug. 12, 1901.

BOROUGH OF DARLINGTON.
(GAS-WORKS DEPARTMENT.)

TENDERS FOR BENZOL.

THE Gas and Electric Lighting Com- mittee invite TENDERS for the supply of 4000 gallons of purified 90 per cent. BENZOL suitable for Gas Enrichment purposes, to be delivered at the Gas-Works in such quantities as may be required during the ensuing Twelve Months.
Further Particulars may be obtained from Mr. Frank P. Tarratt, Gas-Works Engineer, Darlington.
Tenders, endorsed "Tender for Benzol," to be delivered at my Office, Houndgate, Darlington, not later than Aug. 22.
No pledge is given that the lowest or any Tender will be accepted.
HENRY G. STEAVENSON,
Town Clerk.
Town Clerk's Office, Darlington,
Aug. 16, 1901.

URBAN DISTRICT COUNCIL OF BUXTON.
(GAS DEPARTMENT.)

THE Gas Committee of the above Council are prepared to receive TENDERS for the MATERIALS and WORK required in the following Contracts:—

CONTRACT No. 3.—Two RETAINING WALLS and the erection of a STEEL JOIST and CONCRETE COVERING over the River.
Do. No. 4.—CONDENSERS (Capacity 40,000 cubic feet per hour).
Do. No. 5.—WASHER-SCRUBBER (Capacity 40,000 cubic feet per hour).
Do. No. 6.—STATION METER (Capacity 40,000 cubic feet per hour).
Do. No. 7.—RETORT-STACK for Five Double Settings of Eights (two only to be furnished with Retorts, &c.), on the Regenerative System, with Chimney, Cellars, &c.
Do. No. 8.—Two PURIFIERS, 40 ft. by 25 ft. by 5 ft., with Elevator, &c.
Do. No. 9.—TAR-EXTRACTOR (Capacity 40,000 cubic feet per hour).
Do. No. 10.—VALVES.
Do. No. 11.—CAST-IRON MAINS & SPECIALS.

Copies of Specifications and Bill of Quantities may be obtained from, and Plans seen at, the Office of Mr. Harold Barker, Gas Engineer, Town Hall, Buxton, on payment of Two Guineas in each case, which will be returned on receipt of a *bonâ-fide* Tender.
Sealed Tenders, endorsed "Contract No. —," to be delivered to the undersigned not later than Saturday, Sept. 21, 1901.
The Gas Committee do not bind themselves to accept the lowest or any Tender.
(Signed) JOSIAH TAYLOR,
Clerk to the Council.
Town Hall, Buxton,
Aug. 13, 1901.

FILEY URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Council invite Tenders for the supply of 700 Tons of GAS COAL, either screened, unscreened, or D.S. Nuts, to be delivered at the N. E. Railway Company's Coal Depôt, Filey, in about equal monthly quantities in the Six Months ending the 30th of June, 1902.

The lowest or any Tender not necessarily accepted.

Tenders, addressed to the Chairman, Council Offices, Filey, marked "Coal Tender," to be sent in on or before Monday, the 26th of August inst.

BOROUGH OF BRIGHOUSE.
(GAS DEPARTMENT.)

OXIDE OF IRON.

THE Gas Committee are prepared to receive TENDERS for the supply of 100 Tons of OXIDE OF IRON PURIFYING MATERIAL.

Sealed Tenders, endorsed "Oxide," to be delivered to me on or before the 24th of August, 1901.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
JAMES PARKINSON,
Town Clerk.

Municipal Offices, Brighouse,
Aug. 15, 1901.

GLASGOW CORPORATION.
(GAS DEPARTMENT.)

PROVAN GAS-WORKS.

THE Corporation of Glasgow invite TENDERS for providing and erecting Two THREE-LIFT GASHOLDERS, with FRAMING, required in connection with their Provan Gas-Works.

The Drawings may be seen, and *copies* of the Specification and Form of Tender obtained, upon application to Mr. W. Foulis, the Engineer, at his Office, 45, John Street, Glasgow, upon payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Sealed Offers, endorsed "Gas Department, Tender for Gasholders," must be lodged with the Subscriber on or before Tuesday, the 27th curt.

All Offers must remain open for acceptance for a period of Thirty days from the date thereof; and the Corporation do not bind themselves to accept the lowest or any Tender.

J. D. MARWICK,
Town Clerk.

City Chambers, Glasgow,
Aug. 6, 1901.

BRIGHTON AND HOVE GENERAL GAS COMPANY.

TO THE PROPRIETORS.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Company's Offices, No. 5, Great Winchester Street, London, on Friday, the 6th of September, 1901, at Two o'clock in the Afternoon precisely, to receive the Report of the Directors and the Accounts of the Company for the Half Year ended the 30th of June, 1901, to declare Dividends, to elect Auditors, and for other purposes.

The TRANSFER BOOKS of the Company WILL BE CLOSED from the 24th of August to the 6th of September, both days inclusive.

By order,
ERNEST L. BURTON,
Secretary.

5, Great Winchester Street,
London, E.C., Aug. 20, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

THOMAS DUXBURY & CO.,
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Best Gas Coal and Cannel, giving High Illuminating Power, Large Yield per ton, and reasonable in Price.

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DALKEITH, N.B.

COUNTY BOROUGH OF SWANSEA, SOUTH WALES.

IMPORTANT ISSUE OF NEW ORDINARY AND PERPETUAL DEBENTURE STOCK OF AND IN THE SWANSEA GASLIGHT COMPANY.

MESSRS. JOHN M. LEEDER & SON have received Instructions from the Directors of the Swansea Gaslight Company to OFFER FOR SALE, by Public Auction, at the Hotel Metropole, Swansea, on Friday, September 6, 1901, at 2.30 for 3 o'clock p.m. precisely,

£20,000
NEW ORDINARY STOCK
(Entitled to 5 per Cent. Interest per annum), and
£6000
4 per Cent. PERPETUAL DEBENTURE STOCK
OF AND IN THE
SWANSEA GASLIGHT COMPANY.

Being part of the Additional Capital of the Company authorized to be raised by the Swansea Gas Act, 1898, and pursuant to the Provisions and Conditions therein contained.

Purchasers of the New Ordinary Stock, 1898, will be entitled to Four Months' Interest at 5 per cent. per annum as from the 1st of September, 1901, payable on the 4th of April, 1902; and Purchasers of 4 Per Cent. Perpetual Debenture Stock, 1898, to Four Months' Interest due, and payable on, the 1st of January, 1902.

Particulars, with Conditions of Sale containing all necessary Information, may be obtained on application to THORNTON ANDREWS, Esq., Secretary and Manager of the Swansea Gaslight Company, Oystermouth Road, SWANSEA, or to the AUCTIONEERS, 46, Waterloo Street, SWANSEA.

PUBLICATIONS
ISSUED BY
WALTER KING,
11, BOLT COURT, FLEET STREET, E.C.

GAS COMPANIES' BOOK-KEEPING—A Practical Treatise on the Keeping of Gas Companies' Accounts. By JOHN HENRY BREARLEY & BENJAMIN TAYLOR, of Longwood. *Net Price: Cloth* 12*s.* 6*d.*; *Morocco Gilt*, 18*s.*

THE GUIDE-FRAMING OF GASHOLDERS and other Papers—Chiefly relating to Strains in Structures connected with Gas-Works. By F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E. *Price* 6*s.*, *Cloth Bound, Bevelled Boards.*

THE VALUATION OF GAS, ELECTRICITY, AND WATER WORKS FOR ASSESSMENT PURPOSES.—Second Edition. By THOMAS NEWBIGGING, M.Inst.C.E., and WILLIAM NEWBIGGING, Assoc.M.Inst.C.E. *Price* 5*s.*

AUTOMATIC METER REGISTER.—The Meter Life Book specially adapted and revised for "Slot" Meter Registration by ROBERT P. KEYS. *In sizes to record* 1000 *Meters, with Index, half bound*, 42*s.*; *to record* 500 *Meters*, 35*s.*; *to record* 250 *Meters*, 31*s.* 6*d.*

THE POWERS OF CHARGE OF THE METROPOLITAN GAS COMPANIES: A History of the Question of Price in London from the Introduction of Gas Lighting to the Present Time. By LAURENCE W. S. ROSTRON, M.A., B.C.L., of New College, Oxford, and Lincoln's Inn, Barrister-at-Law. With a Preface by GEORGE LIVESEY, M.Inst.C.E. *Price* 6*s.*, *post free.*

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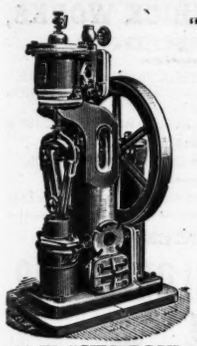

Fig. 705. "SINGLE RAM" STEAM-PUMP.

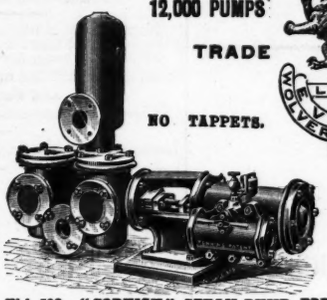

Fig. 866. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

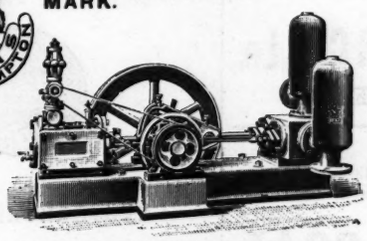

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

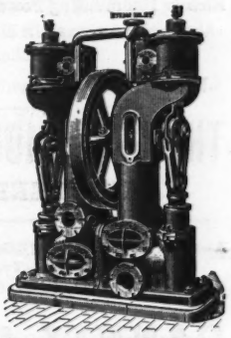

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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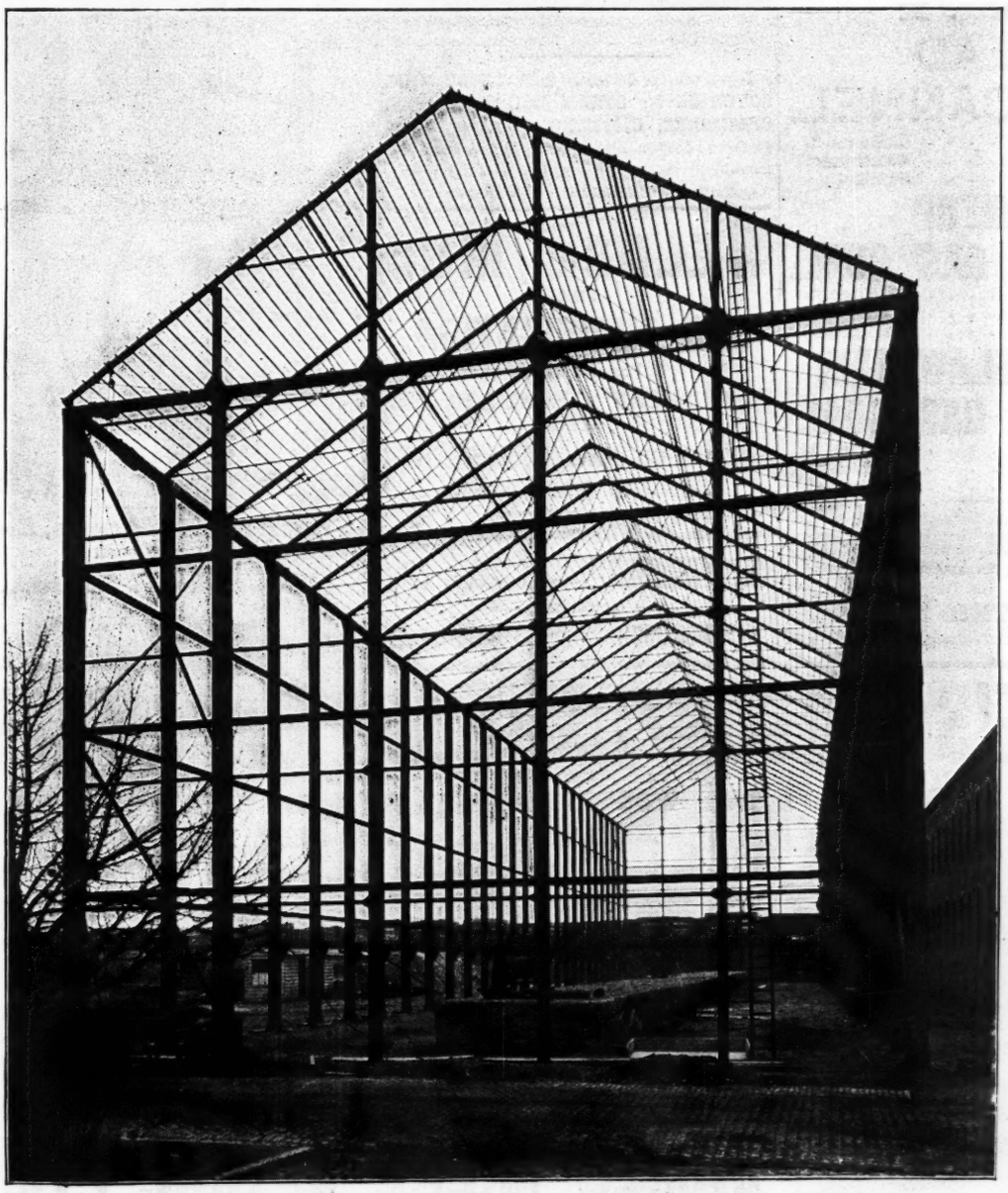

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Illuminating Power	17·8 candles.
Coke	70 per cent.

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Illuminating Power	16·3 candles.
Coke	73·1 per cent.

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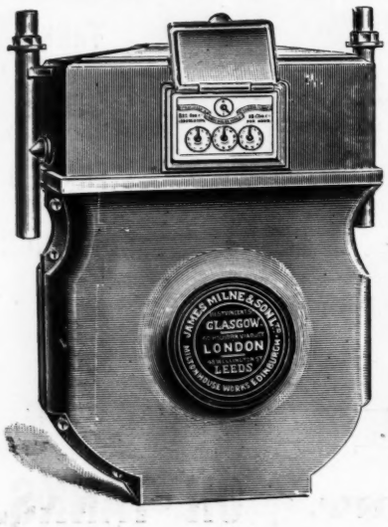

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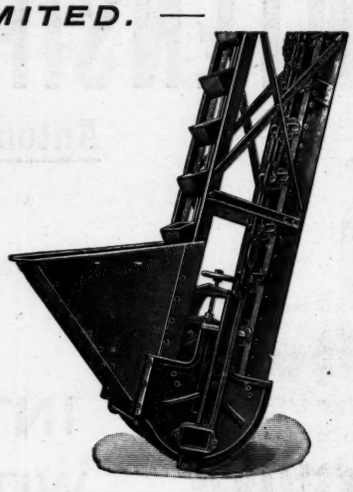

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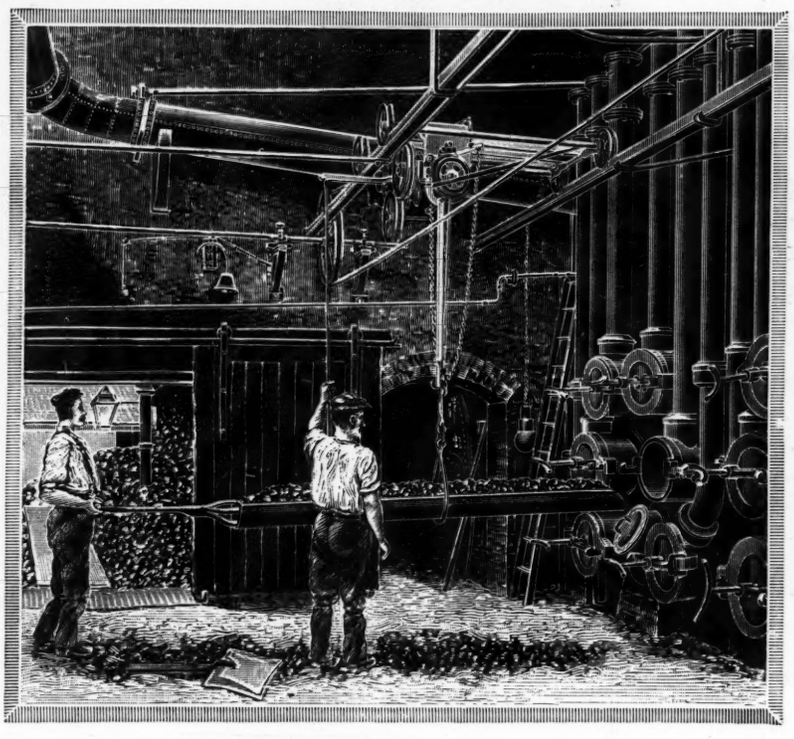

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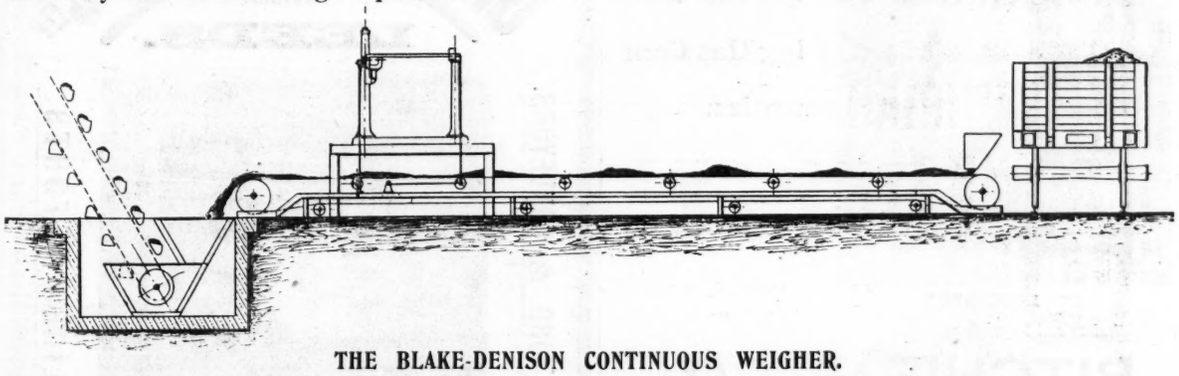

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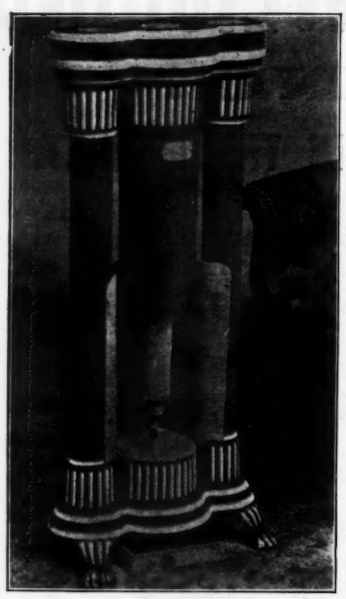

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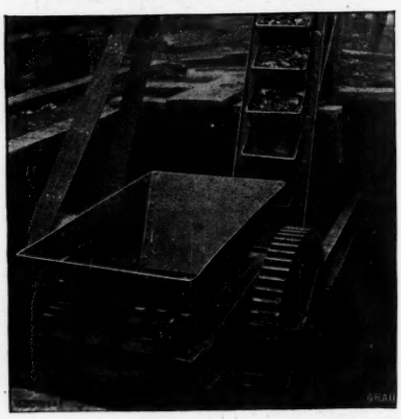

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PHOTO, SHOWING ELEVATOR FOR COLD COKE.

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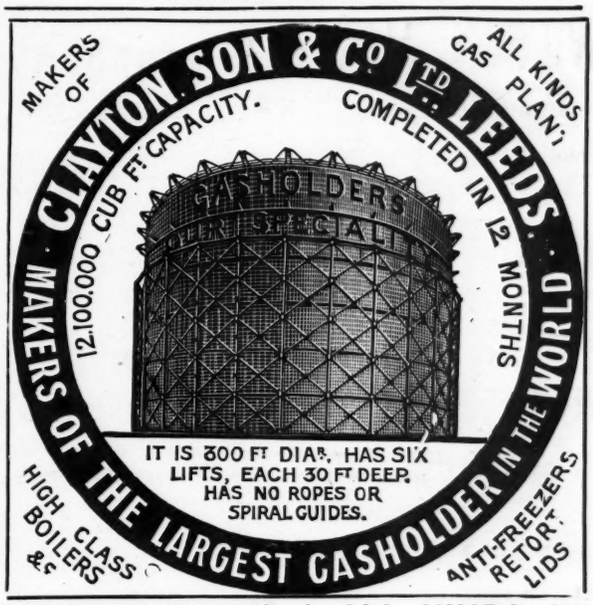
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View of Top of Retort-Bench, containing 484 Mouthpieces, showing Arch and Dip Pipes, Hydraulic and Foul Mains, &c., erected by R. & J. D., Ltd., at the Bradford Road Gas-Works of the Manchester Corporation.

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(See Also Advt., p. 434.

LONDON; Printed by WALTER KING (at the Office of King, Sell, and Olding, Ltd., 12, Gough Square), and published by him at 11, Bolt Court, Fleet Street, in the City of London.--Tuesday, Aug. 20, 1901.